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NATIONAL MARINE ENGINEERS IN SESSION.

For the first time in a number of years the National Marine Engineers' Beneficial Association is holding its annual convention in Cleveland this week. As a rule the conventions of the association are held in Washington, where the members, who are from nearly every state and territory in the union, may meet their representatives in congress and thus have a direct influence upon legislation. There are now 16,000 engineers in the organization and the delegates at the convention number nearly eighty. At the opening session on Monday very little was done other than to appoint committees. The members were addressed by Assistant Corporation Counsel Beacom on behalf of Mayor Farley, and President George Uhler responded. Monday afternoon was given up to a visit to the Otis Steel Works and to the Garfield memorial.

The session of Tuesday morning was quite important. Upon motion of National Conductor Roche, the greetings of the national association were ordered sent to the Licensed Tugmen's Protective Association, now in session in Buffalo, and the same course was ordered for the American Association of Masters and Pilots, now in session at Washington, upon motion of Representative McKee. The following resolution, adopted at the last session of the association, was re-adopted and ordered sent to the appropriate committee in congress:

"Whereas, the interest of the whole country, the re-inforcement of our navy, the increased employment of our mechanics and marine engineers, and the training of our men to man our ships, would all be promoted by the restoration of our merchant marine to its former grand position on the seas of the world; therefore, be it

"Resolved, by the National Marine Engineers' Beneficial Association, in convention assembled, that in our opinion it is the duty of congress at the earliest possible day to extend such aid by subsidy to mail carriers and freighters, owned by Americans and sailing under the American flag, as will enable them to successfully compete with the subsidized merchant ships of foreign countries in the carrying of our imports and exports; provided that such ships shall be fully officered by citizens of the United States, and in addition thereto at least 35 per cent. of the balance of the crews shall be citizens of the United States."

It was decided to increase the salary of the national president to $2,400 per annum and to have a fixed office in Philadelphia. The office of past national president was restored and the referendum clause in the constitution was expunged. It was also decided to recommend an amendment to existing law to make the indicated horse power instead of tonnage the basis for an engineer's certificate. It is claimed that the present law fixing tonnage as the basis works a hardship to many competent engineers who are excluded from vessels of greater tonnage and who are yet in charge of engines of far greater horse power than those carried upon the vessels from which they are excluded. The members spent Tuesday afternoon in a trip up the river upon the tug Harvey Goulder and visited the ship yards and dry docks.

At the session on Wednesday morning the following officers were elected: George Uhler of Philadelphia, national president; Frank A. Jones of San Francisco, national vice president; George A. Grubb of Chicago, national secretary; Albert L. Jones of Detroit, national treasurer; William Sheffer of Baltimore, Joseph Brooks of Philadelphia, and John McG. Sterritt of New York, advisory board. During Wednesday afternoon nearly all of the members went to Lorain to inspect the steel works and the ship yards. The vessel owners and the executive committee of the Lake Carriers' Association have been invited to attend the convention during the latter part of the week.

Following is a list of the delegates present with associations which they represent: John Ranney and William Brown, No. 1, Buffalo; John B. Heyward and James Murray, No. 2, Cleveland; W. P. Tindall, Frank McDonald and A. L. Jones, No. 3, Detroit; George A. Grubb and Roy L. Peck, No. 4, Chicago; William Sheffer and J. H. Mittendorf, No. 5, Baltimore; William Cavanaugh and William Bridges, No. 9, Milwaukee, John W. Anderson and Joseph Brooks, No. 13, Philadelphia; N. P. Slater and J. A. Braman, No. 27, Bay City; William F. Yates, William J. DuBois, J. McG. Sterritt, Robert Jones, P. J. McDermott, Frank McKee, Lawrence Gratton and Frank Houghton, No. 33, New York; Frank A. Jones and Edward Murphy, No. 35, San Francisco; William N. Decker and J. A. Page, No. 37, Toledo; George N. Gilson, No. 38, Seattle; James Hunter and Edward Crossley, No. 39, Erie; W. H. Marshall, No. 41, Goble, Ore.; James A. Southgate and W. P. Boynton, No. 43, Port Huron; W. R. Patterson, No. 44, Manistee, Mich.; John Hegemer, No. 48, Sandusky, O.; James Cummings, No. 51, Muskegon, Mich.; William Densemore, No. 53, Marine City, Mich.; John T. Cook and N. N. Frost, No. 59, East Boston; John P. Jorsch, No. 77, Manitowoc, Wis.; James H. Bishop, No. 78, Duluth; William J. MacDonald, No. 87, Detroit; Patrick Roche, No. 91, Ashtabula, O., and Joseph R. Hall, No. 92, Saginaw Mich.

FINAL DETAILS REGARDING THE NEW BATTLESHIPS.

The navy department has cut out from the specifications for the battleships, for which contracts have just been let, items aggregating in value about $80,000. It has also considerably reduced the fund reserved for superintendents, inspection and coppering, thereby making more of the $3,600,000 named by congress as the limit of cost available. Therefore Secretary Long was able to offer to the lowest bidders, the Newport News company and Bath Iron Works, the sum of $3,590,000 each for the construction of one sheathed battleship. Judge Payson, representing the two companies, has accepted the offer, and nothing remains to be done but to prepare and sign the contracts.

The navy department has formally accepted the battleship Wisconsin from the Union Iron Works, San Francisco.

OUTLOOK FOR ANOTHER SEASON ON THE LAKES.

It is, of course, not encouraging to the vessel interests of the great lakes that up to this time absolutely nothing has been done in the way of freight contracts for another year. The delay means that the iron ore interests are satisfied that even on a basis of last year's costs for steamboat fuel, labor, etc., with probably a slight reduction in the charge for unloading ore, they will not be called upon, in view of the large number of new ships coming out, to pay more than 85 cents a ton from the head of Lake Superior, and they are very probably expecting that the rate will be considerably less than 85 cents if later developments result in lower costs; and it would seem that the lower costs must in some way be brought about in the vessel business, as in other lines. It is, therefore, probably well for all concerned that little has been said up to this time about ore freights for the coming season. Anything that might possibly be done now would necessarily be to the disadvantage of the ship owner. The representatives of ore mining companies have held no meetings as yet and have therefore done nothing towards prices of ore, but it is understood, of course, that the matter of ore prices does not now have the effect upon the lake freight market that it did some time ago, as the great bulk of the Lake Superior product is controlled by the large steel and iron concerns that produce and consume their own ore; such as the Carnegie company, for instance, with a production approximating 4,000,000 tons. These large producing-consuming interests are just now inclined to talk of liberal freights and a fairly high basis all around in the iron and steel trades, because of their interest in a general high range of costs, but the situation will probably be different when it comes to making contracts later on. At this time a year ago all the ore carriers of the lakes were under contract on the $1.25 lake freight basis established by representatives of Mr. Rockefeller. Today the same fleet could be engaged at something less than 85 cents, but as noted above the prospects for another year are not definite enough to warrant the chartering of vessels at any price.

Shippers of soft coal are not in position to talk of freights at all as yet. The large railroad concerns of the northwest are not in the market, and even if they were ready it is not probable that anything would be done, as the meetings of operators and miners for a settlement of wages do not occur until next week.

FROM SHIP YARDS OF THE GREAT LAKES.

Officials of the American Ship Building Co. are evidently planning upon providing considerable new work for their different yards in times of dullness on the lakes by seeking orders in the east for ships that will not only be suited to Atlantic coast trade and to trade with South American ports, but which will be staunch enough and large enough to go to almost any part of the world. The two 7,000-ton steamers to be built for interests represented by Chas. E. & W. F. Peck of New York will represent the initial effort of the lake builders in this regard. The term 7,000-ton steamers in this case means that the vessels will be capable of carrying 7,000 gross tons (2,240 lbs.), in addition to bunker capacity for about 1,000 tons of fuel. It will be noted from the dimensions—450 ft. over all, 43 ft. beam and 35 ft. depth—that the locks of Canadian canals from Lake Erie to the Atlantic seaboard are a serious draw-back in the matter of beam, as the limit of 43 ft. is due to the dimensions of the locks. It would of course be practical to build in two parts, as these vessels are to be built, for passage through the canals a much larger craft but for the restriction in breadth. Messrs. A. B. Wolvin and James C. Wallace of the American Ship Building Co. are now in Canada looking into matters pertaining to the passage of the vessels to Montreal where the parts are to be put together. The ships are to be completed about October next, so that they may be taken to New York before the close of navigation. They will be classed by the Great Lakes Register of Cleveland. It was at first proposed that in the passage of this kind of vessel to Montreal a temporary wooden bow would be built on the part containing the machinery, and this part would then tow the other half, thus saving tug hire on the long, slow trip through Lake Ontario, the canals and river. It is not probable, however, that this scheme will be tried unless the vessels are completed early next fall and a thorough consideration of the plan warrants such an experiment.

Mr. W. H. Mayer of Milwaukee, who recently sold his wooden vessels to J. C. Gilchrist of Cleveland, and who is negotiating for the construction of one or two steel steamers, says he will have a vessel or vessels of about 5,000 gross tons capacity, as he thinks a freighter of that size can be operated to better advantage than a 7,000-ton ship by the owner who has no connection with the iron ore concerns. Mr. Meyer is figuring with the Craigs of Toledo and the Jenks company of Port Huron, as well as the American Ship Building Co. He says the latter company will shortly have a berth vacant at Superior which they can give him.

Milwaukee ship yards of the American Ship Building Co. have engaged on the usual large amount of winter repairs to wooden vessels, but there are no very big jobs. Among wooden vessels on which general repairs have been or are to be made, are the steamers Omaha, Tom Adams, Iosco, Walter Vail, Pueblo, Topeka, Delaware, A. McVittie, Clarion, F. & P. M. No. 5, Thomas W. Palmer, and schooners Olive Jeanette and Baltic. Some repairs to steel vessels are also booked for the Milwaukee docks.

A small steel passenger steamer, intended for service in connection with the Pan-American exposition, may be put down shortly at the Union works of the American Ship Building Co. at Buffalo, but arrangements with the builders have not as yet been fully made.

About 1,500 men are now employed at the two ship yards of the American Ship Building Co. at Buffalo. About a dozen large vessels are undergoing repairs and this work really amounts to more than the operations on new ships.

NAVAL APPROPRIATION BILL.

The naval appropriation bill was reported to the house of representatives during the present week. It is the largest which has ever been reported to congress, exceeding the great bill of last year by $11,865,718. The total appropriation is $77,016,635. Concerning new ships for the navy the report says:

"For the purpose of further increasing the naval establishment of the United States, the committee recommends that the president be authorized to have built by contract two unsheathed sea-going battleships, carrying the heaviest armor and the most powerful ordnance for vessels of their class, upon a trial displacement of about 14,000 tons each, to have the highest practicable speed and greatest radius of action, and to cost, exclusive of armor and armament, not exceeding $3,850,000 each, and two unsheathed armored cruisers carrying the heaviest armor and most powerful ordnance for vessels of their class, upon a trial displacement of about 14,000 tons each, and to have the highest practicable speed and greatest radius of action, and to cost, exclusive of armor and armament, not to exceed $4,000,000 each. Maximum cost of the vessels herein authorized, exclusive of armor and armament, will be $15,700,000."

shall be built in one yard or by one party, and the usual provision is made

The bill provides that not more than one battleship or armored cruiser that at least one, and not more than two of the battleships and armored cruisers shall be built on the Pacific coast. Of the appropriations for the various branches of the service the principal item is $25,400,000 for increase of the navy. The pay of the navy is increased $2,489,387 over the appropriations for the same object last year, and is accounted for by the authority granted to the department to enlist 5,000 additional seamen and fifty warrant machinists to meet the necessity of properly manning the new ships soon to be added to the navy. To meet the emergency of the lack of officers for the new ships the bill provides that the two classes now at sea which have completed their four years' course at the naval academy shall be commissioned thereupon. This will provide for the new officers desired by the department, and, in the judgment of the committee, will meet all the exigencies of the present situation. The continued necessity for an emergency fund is found to exist in the unsettled state of affairs in the far east and enables the department to meet contingencies which it is impossible to estimate with sufficient accuracy.

The following places receive appropriations for naval work: Portsmouth, $378,850; Boston, $526,000; New York, $1,009,000; League Island, $695,230; Washington, $318,210; Norfolk, $594,260; Key West, $144,000; Mare Island, $331,660; Puget Sound, $273,000; San Juan, $40,000; Pensacola, $41,500; Algiers, $230,000; Dry Tortugas, $100,000; Hawaii, $107,300; Tutuila, $225,000. For the four new dry docks now being built at Portsmouth, Boston, League Island and Mare Island, $1,000,000 is provided. The committee recommends this year an appropriation of $3,000,000 toward the rebuilding of the naval academy. In last year's bill $350,000 was appropriated, prior to that time $1,220,000, making a total appropriation of $1,570,000 prior to the present bill. The report says in part, as to armor:

"Your committee also provides under the increase of the navy an appropriation of $4,000,000 for armor and armament for ships now under construction. It will be remembered that congress wisely solved the perplexing question of providing armor plate for our ships last year by the enactment of a provision giving the secretary of the navy full power to buy armor at such price as in his judgment might seem reasonable and just, or build an armor plate factory, toward which $4,000,000 was appropriated. It ought to be a matter of general congratulation that the armor plate question has been settled through the skill, firmness, and excellent judgment of the secretary of the navy in carrying out the evident purposes of congress."

SENSATIONAL STORY REGARDING THE ROYAL YACHT.

England has been suffering during the past two or three years from yellow press invasion and the British admiralty is one of its victims. An example is furnished in a sensational statement that Mr. Watson, the well known Clyde yacht designer, had been called in to report upon the new royal yacht Victoria and Albert and had pronounced her a total failure. Engineering, discussing the report, says:

"We have been told that Mr. G. L. Watson has been given a free hand to put matters right. This, on the face of it, is absurd, especially as a large number of workmen are busy finishing the vessel in accordance with plans prepared at the admiralty. The facts are simply these: When, in accordance with precedent, her majesty was craved to express her approval of what had been done, she, without inferring any doubt of their completeness or suitability, desired that the arrangements for her comfort and convenience on board should be inspected and reported upon by someone experienced in the construction of screw steam yachts. It will be borne in mind that the queen has hitherto been accustomed to paddle yachts. Mr. Watson, being favorably known to the Prince of Wales and Admiral Fullerton, as a designer of both steam and sailing yachts, was accordingly called in to make the desired survey. No misgivings whatever exist in the minds of the admiralty authorities (or, indeed, in the mind of any well informed person), as to the strength, speed, or sea-going qualities of this vessel; nor was there ever any intention to refer any question of naval architecture to any one besides the director of naval construction. Mr. Watson has made his survey; but has not yet prepared his report. Moreover, he himself has promptly contradicted the absurd reports published. To a representative of the Glasgow Herald, who interviewed him on his return to Glasgow after inspecting the yacht, he said that, so far as his judgment goes, the unfavorable reports are 'as untrue as they seem to be malicious.' He was, he added, not asked to report as to the structure and stability, and in his opinion there should be no doubt on the part of the public, or those more immediately concerned, in regard to these points, her majesty's constructors being perfectly competent to deal with them. No other experts have been called in."

Joint resolutions signed by the chamber of commerce, the Manufacturers' Association and the Board of Trade of San Francisco have been sent to Senators Perkins and Bard and Representatives Kahn and Loud, to be presented to Secretary Long, asking him to award one battleship to the Union Iron Works, to be built within the government appropriation.

FULL NAMES OF NAVAL OFFICERS.

The new naval register contains an innovation in the insertion of the full names of officers. Curiously enough, this rule is not applied to officers of the marine corps, whose first and last names and middle initials are given. Under a recent order every officer must send to the department his full name for insertion in the register, and only a few, for various reasons, have failed to do this. It is said that some officers objected to the new practice, while others welcomed it. Heretofore the practice has been to insert an officer's first given and his family names and the initial or initials of the middle name or names. Hyphenating was not permitted. If an officer who had entered the service as John Smith Jones wanted to be entered as Smith-Jones under Ss in the alphabetical list, this privilege was denied him and he was put down with the Js as John S. Jones. The list begins with the name of John Davis Long, secretary of the navy. Of the nineteen flag officers, five, including Admiral Dewey, have no middle names. Capt. George Francis Faxon Wilde of the Oregon is the only officer above the grade of commander who has three given names. The register shows that Rear Admiral Melville, chief of the bureau of steam engineering, is not George Washington, but George Wallace Melville, and Lieut.-Com. Southerland is one of the few men with the initials W. H. H. whose given names are not William Henry Harrison. He is William Henry Hudson Southerland. Royal Bird are the given names of Rear Admiral Bradford, chief of the equipment bureau. It becomes known through the register that "Fighting Bob" Evans was called Rubley Dunglison by his parents. The junior captain is John Jacob Hunker, and his brother, a lieutenant commander, is Jacob John Hunker. There are many cases of alliterative names in the list. Com. Charles Carpenter Cornwall is the senior officer whose three names (not to speak of his title) begin with the same initial. In the army, however, this example of alliterative cognomens is beaten by Col. Camilo C. C. Carr of the cavalry. Then there are Lieut.-Com. Frank Friday Fletcher, and Henry Hibbard Healey, Lieuts. Albert Ammerman Ackerman, William Wilmot White, Bion Barnett Bierer and Henry Hughes Hough, and Passed Assistant Surgeon Harold Hamilton Haas. In the brief list of civil engineers there is a Christopher Columbus and a Ulysses Simpson Grant. Four surgeons, Barber, Rothganger, Smith and Lung, whose names appear together on the list of the medical corps, are four Georges. A chaplain has the middle name of "Ironsides," a lieutenant the first name (not the title) of doctor, a commander the middle name of Holdup, while a lieutenant of the line was appropriately called seaman by his parents.

SUCCESSFUL TEST OF OIL FUEL APPARATUS.

Recently the steamship Khodoung, a petroleum tank steamer which has been built by Sir W. G. Armstrong, Whitworth & Co., Ltd., for the Burmah Oil Co. of Rangoon, went out to sea from the Tyne for a trial of her machinery and the oil fuel apparatus and burners. This vessel is intended for the transport in bulk of Burmah petroleum or kerosene from Rangoon to Calcutta and all arrangements have been designed to meet these requirements. The Burmah Oil Co. has extensive oil fields and wells in Burmah. Its refinery alone, near Rangoon, employs a great number of men in the production of what is known as Oriental kerosene, bazaar oil, jute oil and other products derived from the distillation of Burmah petroleum oil. The steamers and boilers belonging to the company use entirely for the generation of steam what is described in the east as "earth oil fuel refuse." It is at low temperatures of the consistency of lard, and steam coils are required to keep it in the liquid form when employed in regions of low temperature. It has a very high flash point, which, it is stated, is considerably above 200° Fah. The machinery, which has been constructed by the Wallsend Slipway & Engineering Co., is of the triple expansion type, and of the newest design, having three cylinders, 19 in., 31 in. and 51 in. diameter, with a stroke of 36 in., and is placed, as is usual with oil tank steamers, at the after end of the vessel. Steam is supplied by two single-ended boilers, working at a pressure of 180 lbs. per sq. in.. An extra large boiler is also fitted for auxiliary purposes. All the boilers, both main and auxiliary, have been designed to burn Burmah oil fuel refuse with Orde's burners. The oil fuel bunkers form part of the vessel, and have been very strongly built, and the arrangements generally are of a complete and satisfactory nature. The oil fuel burners, which are in duplicate to each furnace, and the arrangements in connection with the installation, have been designed by Mr. Orde, who is connected with Sir W. G. Armstrong, Whitworth & Co. During the trial all the oil apparatus worked in a very satisfactory manner.

The point of interest of the trial was that this was the first occasion in England of Burmah oil fuel refuse being used for the generation of steam. A number of vessels have now been fitted on the Tyne for burning oil fuel, and there is every reason to believe that in the near future oil fuel will be more largely used; it appears only a question of time and arrangement. We have only to add that the machinery during the trial worked admirably.—The Engineer, London.

MACHINERY OF TORPEDO BOATS IN BAD CONDITION.

Because of the deteriorated condition of the machinery of torpedo boats the formation of a flotilla to accompany the North Atlantic squadron on its winter cruise was found to be an impossibility. It had been intended to attach six boats to Rear Admiral Farquhar's command, but despite the strenuous effort made, few boats were found with machinery in a condition for maneuvers with the armor clads. The department has directed that all the torpedo craft be given a thorough overhauling, and many thousands of dollars will have to be expended in putting them into condition for sea service. This unfortunate climax to the department's program of attaching torpedo boats to the North Atlantic squadron has resulted in the submission to the navy department of a memorandum by Rear Admiral A. S. Crowninshield, chief of the bureau of navigation, calling attention to the bad condition of the engineering departments of the boats. Admiral Crowninshield says the boats that have been kept in service run without trouble and their machinery is kept in perfect order. Admiral Crowninshield then suggests a remedy, which has created a stir in naval circles. He suggests that a station for torpedo boats be established at Norfolk, Va., where there is no danger of their being frozen in, and that each department of the navy be called upon to furnish a memorandum as to the best method of caring for the part of the craft under its particular control.

MANUFACTURE OF CELLULOSE.

THE EXPANSIVE MATERIAL THAT IS TO PLUG UP HOLES IN VESSELS OF WAR—TONS OF IT USED IN OUR BATTLESHIPS AND CRUISERS—THE PITH OF CORNSTALKS.

The Tradesman, a southern publication, contains an article in a recent issue upon the use of cellulose in warships and its manufacture. It is written by Mr. T. S. Ayers, superintendent of the Marsden plant at Owensboro, Ky. The Marsden Cellulose Co. has recently built a new plant at West Point on the York river. As an industry the manufacture of cellulose is comparatively unknown. Cellulose is the pith from the mature and well seasoned cornstalks, with the fiber extracted, so it may readily be seen that to do this on a commercial scale would involve the expenditure of large sums of money for the necessary large factory buildings with the complicated machinery to make the separation of pith from the mass of leaves, shucks, shell joints and fiber. As an industry it created something of value from waste cornstalks and added a manufacturing business that was not competitive, as it did not force any other article aside by its coming into use. To the farmer it has added a value from $5 to $8 to his corn crop. Not a net value, but an amount which he may realize positively for his labor and at times when he would otherwise be unemployed, with the chances that his net profit will be more than that which he derives from his corn. Wherever a factory is located it raises the value of corn land within a distance of ten miles. After the factory is built a buyer is sent out about Aug. 1 among the farmers to make contracts for the season's supply of stalks, and so far the supply has not equaled the demand. Yet this year in Mr. Ayers' locality over 20,000 acres have been contracted for, and this should yield the farmer a minimum of $100,000 and it may reach as high as $160,000. In addition to this, the labor for handling and stacking would cost about $10,000, for it is not in condition to use before the following spring. These stacks, or ricks, are built about 30 ft. wide and 35 ft. high with lengths from 300 to 1,000 ft. long, and average when properly built about two tons per running foot. The removal of material begins on Dec. 1, continues until the following spring, the only condition being that it shall be in proper shape and free from dirt or moisture.

The first step in the course of manufacturing is to place the bundles of stalks on a long conveyor, which carries them to a heavy cane cutter, where they are cut into ½-inch lengths. From there the material goes to a series of reels, where it is divided into three streams, the larger leaf and shuck in one, small pieces of leaf, shuck and shell in another, the pith in its first stage of separation in the other. The larger leaf and shuck is baled and sold as cattle fodder, or the shuck after being separated and with some additional preparation, is sold to the mattress maker. The fine pieces of leaf shuck and shell goes on to the main mill, where it is ground into a fine meal for cattle feed. The pith goes to separators, which extract all the remaining leaf, shuck and shell it is possible to get before being ground. The government regulations call for uniform sizes, and after being ground the final separation is made. This part is most difficult to do, as there are the small pieces of leaf, shuck and fiber which have about the same specific gravity as pith, and then the pieces of joints and shells, the same size as the cellulose, yet far heavier. This part is finished on a series of ingenious machines and when it drops into the bag finished and ready for chemical treatment and pressing, it has not been touched since as raw stalks it was placed in the conveyor traveling over a half mile on belts and conveyors, through pipes and up elevators. The next step is to treat it chemically so as to make it fireproof, as each batch of 200 lbs. is tested by a government inspector with a red hot bar of iron to see if it is proof against burning, and should it flame it is rejected.

After being fire proofed it is then dropped into a 100-ton hydraulic press, which presses thirty-six cakes of cellulose at a time. There are thirty-six tubes in the case, each tube being 6x6x24 in., and these are filled with loose cellulose, then pressed down to about 5 in., and after being taken out of the press raised slightly so that it forms a 6-in. cube. In this shape they are placed in the cofferdams of war vessels. These cakes are placed into cardboard cartons and 140 of them are packed in a box lined with water proof paper, and after being packed the government inspector affixes his stamp on the box, showing when it was passed and approved by him. It is then ready for the United States government. As to its uses, and the conditions which have led up to it, we would have to go back to the European navies, as they were early experimenters in trying to obtain a perfect water excluder for their vessels when pierced by the enemy's shot. Yet it must be confessed that, abroad, their tests were unsatisfactory and often blank failures. The failure was probably due in a measure to the inferior quality of material used, and to its lack of proper treatment for preservation and non-combustion. The faults developed on trial seem to have been inflammability from small explosion, and decomposition and loss of saturating qualities when exposed to moisture. The odor from decaying material was also objectionable.

The Italian navy tried a species of cat tail, but discarded it because of its high cost and bad keeping qualities. The cat tail as used consisted of the furry heads packed in canvas bags and covered with some non-inflammable coating. After that Italy tried a mixture of cork shavings and tar pressed into cakes. France also experimented with the cat tail and various other material, but finally settled on zostive, a sea weed common to the French coast. The sea weed is dried, treated chemically, packed in canvas bags and smeared with a water proof coating. For stowage in cofferdams the zostive is pressed into bricks, and being a marine growth it is safe from deterioration in salt water. In Germany the favored obturating material is cork cut into smooth slabs about an inch thick and closely stowed in the cofferdams with marine glue to fill the interstices. The other powers have made experiments, but came to no definite conclusions as to the relative value of different material.

The object to be attained in the use of cellulose in war vessels is to make the vessel practically unsinkable, and therefore making a stable gun platform by securing the buoyancy against all war dangers except torpedoes. All boats are judged by what is called their metacentric height, which may be defined as the point of intersection of the line of action of the buoyancy when the vessel is upright, with the line of action of buoyancy when the vessel is inclined through a small angle. A vessel that has great metacentric height is said to be stiff; one that has small metacentric height and is easily inclined is said to be "cranky." This height then may be taken as a measure of a vessel's stability. Our monitors have a metacentric height of from 10 to 15 ft., battleships from 3 to 5 ft., and cruisers from 2 to 3 ft. It was decided that after the proper height had been determined in designing a vessel, that means must be taken to retain it. A hole in the side naturally lets in water, reducing the water line area upon which depends this height. The old wooden vessels were attacked by shells that made holes along the water line, but the amount of water that entered was small, owing to the few hits, the swelling of the wood, and the fact that holes in wooden vessels could be comparatively easily plugged.

A steel vessel under fire from modern ordnance is likely to receive a great many shots along the water line, every one admitting water and causing a loss of height and range of stability. The first and most natural way of guarding against such water line damage was to put a belt of armor all around the vessel, extending a few feet above and below the water line. However, guns improved so rapidly that a thick enough belt could not be carried the whole length. So it was carried far enough to protect the machinery and give stability, even if the rest of the water line plating should be destroyed; a thick under-water line deck being carried from the ends of this thick belt to the extremities of the vessel. In the protected cruiser, protection is given to the vitals of the vessel by a thick, curved, turtle-back deck just above the water line, at the center of the vessel, curving down to below the water line, where it meets the sides. Above this deck, to preserve the stability, numerous compartments are formed by water tight metal bulkheads, so that only a small space may be flooded by one shot. However, there is a limit to such subdivisions and few protected cruisers with only the thick deck could stand up long under a well-aimed fire from rapid-fire guns.

The use of cellulose along the slope of the protective deck, to preserve the stability by keeping out the water that might enter, in conjunction with the protective deck to keep the shell from going into the machinery spaces and magazines, was the next important step. For keeping out water a cellulose belt of 3 ft. may be said to be about as efficient as a 6-in belt of steel. The stability can be protected when there is a good protective deck back of it to protect the vitals, with 100 tons of cellulose where 1,000 tons of armor would be required. The policy of the navy department is to give all the height possible to vessels consistent with their being good gun platforms. In vessels of high speed where weight is needed in machinery, and an armor belt cannot be carried, cellulose is used to preserve the stability and a protective deck to protect the vitals. In battleships thick armor is used amidships, and a protective deck and cellulose belt are used beyond the limits of this armor. Before the corn pith cellulose was approved by the navy department it had gone through severe tests, as they had been using cocoa fiber cellulose, which had proved to be unsatisfactory. In June, 1895, at the Indian Head proving ground, cofferdams were prepared which had a belt of cellulose 3 ft. thick and compressed to the density of 6.5 lbs. to the cubic foot, and through this cellulose belt 6 and 8-in. shells were fired at a low velocity so as to be more tearing in their action. The result showed holes in the rear 7½x8½ in. and 10x12 in. These holes had water 5 ft. over them, yet at the end of the tests, one hour later, the reports show that no water had leaked through the shell holes.

The Russian government made similar tests at St. Petersburg, and their reports show that at the end of two hours no water had entered the shot holes. The Italian government made a more severe test, having but a 2-ft. belt of cellulose and with a 10-ft. depth of water over it, yet their report proved how successful this cellulose acted, as no water came through in twenty-four hours. This test was made in June, 1900. The quality of the cellulose has been constantly improved, and within the last few months it has been improved so much that it has an expansive power over double that made by some of the earlier processes. One of the last boats so protected by cellulose was the battleship Kentucky. The Illinois is now being packed with it. The Russian cruiser Variag, which was built by Cramp's at Philadelphia, had a special density of corn pith cellulose pressed for it. Hereafter all war vessels built by the United States government will have specifications calling for belts of corn pith cellulose. The amount for vessels varies from forty to 110 tons. Cruisers like the New York and Brooklyn use the most, while battleships use from fifty to sixty tons.

NAVAL BASE IN THE PHILIPPINES.

The purpose of the government to establish an important naval base in the Philippines has been emphasized by a letter which Secretary Long has written to the chairman of the naval committee of congress asking an appropriation of a million dollars to start the project.

The secretary's estimate is based on a report just received by telegraph from a board composed of Rear Admiral George C. Remey, Capt. Bowman H. McCalla and Civil Engineer Anecito G. Menocal (retired). This board visited all the sites in the archipelago available for use as naval stations and finally decided on Olongapo, a place in Subig bay, about thirty miles from Manila. The report has been approved by Secretary Long, who wants the work of establishing the base begin without delay. The amount asked for is to construct a large dry dock and start the general project. The selection of Olongapo means the abandonment of Cavite as the headquarters of the navy in the Philippines. Subig bay was considered by the Spaniards to be the ideal site for a naval base in the islands, and it was there that Admiral Dewey expected to find Montejo's squadron. Admiral Dewey has urged the navy department to establish a naval station on Subig bay, but other officers believed that Iloilo, in the island of Panay, was the best site. There was also some sentiment in favor of the retention of Cavite. Secretary Long turned the matter of selection over to the board, of which Admiral Remey was president, with instructions to select a site.

The Financial News of London gives further details of the Vickers-Cramp deal, the chief item being that Vickers' Sons & Maxim made an absolute sale of their plants and patents to the Cramp company and the Midvale Steel Co. for $5,000,000 of the amalgamated company's ordinary shares. The sale is conditioned on the correctness of the statement that profits of the last four years averaged $1,800,000 per annum and $2,400,000 during the last two years. This will represent an additional annual profit of $75,000 for the Vickers & Maxim shareholders.

AROUND THE GREAT LAKES.

C. W. Elphicke & Co. of Chicago announce that Mr. R. J. Dunham is now a member of the firm.

Capt. A. B. Drake of Buffalo will again have charge of the work of compiling and publishing the Inland Lloyds Register.

Harvey C. Beeson of Chicago has again compiled a very neat pamphlet giving winter moorings of lake vessels. The work is very well done.

Capt. Wm. Curtis, aged seventy, died at his home in Port Huron a few days ago. He was a resident of Port Huron for forty-three years.

Capt. Jeremiah Harrington, one of the pioneer vessel captains on the great lakes, died Monday at the home of his daughter in Chicago, aged nearly ninety years.

J. A. Jamieson has completed plans for a 1,500,000-bushel elevator at Port Arthur. The structure is for Mackenzie & Mann, to cost $350,000, and will be completed by next September.

W. G. Moore has succeeded M. Riley as superintendent of the N. Y. P. & O. ore docks, Cleveland. Mr. Moore will also have charge of the N. Y. P. & O. Co.'s ore storage plant at Randall, O.

Commodore Wm. H. Wolf, well known vessel owner of Milwaukee, who was very close to death a week ago, on account of the amputation of a leg made necessary by blood poisoning, has been reported as improving of late.

Officers of the Buffalo lodge of the Shipmasters' Association for the ensuing year are: President, E. C. Maytham; first vice-president, J. H. Coleman; second vice-president, W. Robinson; treasurer, John Hall; secretary, John Perew.

Meteor is the name selected for the 3,000-ton steamer (a vessel of Canadian canal dimensions) building at the Craig works, Toledo, for the Hawgood Transit Co. of Cleveland. The Meteor is 1 ft. wider but is otherwise a duplicate of the steamer Tampico, also owned by the Hawgood company and now engaged in Atlantic seaboard trade.

Capt. M. Mulholland, who is finding sale in all parts of the lakes for the patent hatch fastener, which he developed on the steel steamer Alva last season, is now making a special design of corner bracket for the hatch covers of steel vessels. The corner bracket is so well adapted to tightly fastening the round corners that its use more than insures a tight hatch.

Mr. J. C. Gilchrist of Cleveland keeps on buying wooden vessels. He purchased the steamer Neshoto from Robert R. Rhodes of Cleveland a few days ago for $72,000. Mr. Gilchrist now controls twenty-seven wooden vessels, twenty-four of which are steamers, and the American Ship Building Co. is building for him eight steel steamers of about 5,000 gross tons capacity each.

One of the strongest of the labor organizations on the great lakes is the Licensed Tugmen's Protective Association, the general body of which is now in annual session at Buffalo. Although organized only a year ago, this association is said to now have about 2,000 members. Michael Ryan of Duluth has been president during the past year and E. E. Hand of Conneaut, secretary and treasurer.

Officers of the Detroit lodge of the Shipmasters' Association, recently installed, are: President, A. J. McKay; first vice-president and delegate to grand lodge, Wm. Roach; second vice-president, James B. Watts; treasurer, T. Lemay; financial secretary, H. H. Parsons; marshal, James Beauvais; warden, Wm. McLean; chaplain, Charles McIntosh; sentinel, Geo. C. Burns; alternate to grand lodge, Geo. A. Symes.

Another of the steamers of 3,000-ton kind building at Chicago for Charles Counselman and others, and which are to engage in transatlantic trade or in Atlantic coastwise service, as may be deemed advisable from a freight standpoint, was launched at the Chicago works of the American Ship Building Co. on Saturday last and named Northman. These vessels are all of the same size—full Canadian canal dimensions.

Capt. Richard Barrow, an old time vessel captain, died in Cleveland during the present week. He was born in England in 1823 and came to Cleveland in 1832. For several years he managed the side-wheel steamer Telegraph, which ran between Cleveland and Port Stanley. The Telegraph was later sunk in collision with the steamer Marquette. He was the owner and master of the schooner Jessie at the time of his death. Three sons survive him—Richard, William and Arthur.

The funeral of Capt. John Moore, vessel owner of Cleveland, whose death was announced in the last issue of the Review, took place on Saturday last and was very largely attended by vessel men of Cleveland. The pall bearers were John H. Bartow, M. A. Bradley, H. A. Hawgood, B. L. Pennington, E. D. Chilson and Wm. Gerlach. Capt. Moore's yacht was his one source of pleasure, and strange as it may seem the vessel was very probably the source of his death. He sustained internal injuries in handling a very heavy engine which he had selected for the yacht. By Capt. Moore's will, his property, largely of a vessel kind, reverts almost entirely to a brother and two sisters.

By the purchase of the Green Dredging Co.'s plant the Lydon & Drews Co. of Chicago becomes one of the largest dredging concerns in the country. The dredging apparatus purchased from the Green company includes three tugs, three dredges, ten scows and five pile drivers, as well as shops and tool equipment in Chicago. The Green company is the third concern that has been bought out by Lydon & Drews in three years, the other plants purchased being those of the Chicago Star Construction Co. and of the McMahon & Montgomery Co. The Green Dredging Co. has been in business in Chicago for forty years. Its withdrawal leaves but one competitor to Lydon & Drews on the Chicago river, the Fitz Simons & Connell Co.

At the close of navigation in December last the following vessels were in Buffalo loaded with winter cargoes: Laden with wheat—Abyssinia, 119,970 bushels; S. S. Curry, 166,000 bushels; Pretoria, 168,000 bushels; Vega, 110,000 bushels; America, 112,000 bushels; Chili, 139,000 bushels; Kearsarge, 137,000 bushels; Lackawanna, 99,614 bushels; Brazil, 113,000 bushels; J. R. Noyes, 16,000 bushels; total, 1,185,084 bushels. With flaxseed—H. L. Shaw, 249,547 bushels; Senator, 204,839 bushels; Penobscot, 157,854 bushels; total, 612,240 bushels. With oats—Rappahannock, 161,893 bushels. Grand total, 1,959,217 bushels. Of the vessels enumerated the Kearsarge and Penobscot have been discharged, and the Senator is now under the spouts for slow unloading.

It is true that another effort is being made to establish an organization of vessel masters on the lakes that will attempt to deal with wages and other questions of the kind taken up by labor unions. Up to a year or so ago, the vessel masters, who are as a rule in very close touch with important interests of the ship owners, stood aloof from labor organizations, but the spread of these organizations has attracted the attention of a large number of the captains, and formal application has been made to heads of the American Federation of Labor for information as to the course to be followed in order to secure affiliation with that body. It is not probable, however, that an association will be formed just now, as the proportion of captains opposed to anything of the kind is very large. The Ship Masters' Association, which includes in its membership probably half the captains. is a benevolent and social organization, and has steadfastly refused to deal with the subject of wages.

The passenger steamer Kingston, which is being built at the Bertram Iron Works, Toronto, for the Richelieu & Ontario Navigation Co., was launched last Saturday. Dimensions of the steamer are as follows: Length over all, 290 ft.; extreme breadth over guards, 64 ft.; molded depth of hull, 14 ft.; depth of steamer from top of dome deck to bottom of keel, 43 ft. The steamer has five decks, namely, the orlop, or the lower deck, the main deck, saloon deck, gallery deck and hurricane deck. The machinery consists of an incline three-crank triple expansion engine, with cylinders 28, 44 and 74 in. in diameter, respectively, having a common stroke of 6 ft. The paddles are 22 ft. in diameter. The steam is furnished by four cylindrical return tubular boilers, 11 ft. diameter and 12 ft. long, passed by the Canadian government inspectors for 184 lbs. working pressure of steam. The boilers are fitted with the Howden hot draft system. In this connection it might be mentioned that the sister ship, Toronto, on her trials for economy, made a record as low as 1.68 lbs. of coal per indicated horse power per hour. which is regarded as the highest record for economy of any paddle wheel engine known.

RELEASING DEVICES FOR SHIPS' BOATS.

In view of all that has been said in the newspapers of the country during the past year regarding the important subject of releasing devices for ship's boats, it would seem that the board of supervising inspectors of steam vessels, now in session in Washington, should give some attention to this matter. Some of the new members of the board who have proven energetic and eminently fair, will at least be warranted in looking into the question. Just as the Review goes to press we have a communication from a practical vessel man, who cannot be said to be entirely disinterested in the matter of releasing devices, but whose opinion is worthy of consideration just the same. He says:

"Section 4488 of the revised statutes provides that 'all steamers carrying passengers shall have the lifeboats required by law provided with suitable boat-disengaging apparatus, so arranged as to allow such boats to be safely launched while such vessels are under speed or otherwise.' A fine of $1,000 is imposed for not complying with the requirements made by the board of supervising inspectors. No device has been approved up to this year. Has the board made an effort to find a device that will save life? If not, where does the responsibility rest for loss of life? It is the intention of the law that the best devices shall be used in all parts of a ship, and it is the duty of the board to ascertain what the best devices are and to see that the law is carried out, not so much in the interests of the steamboat men, but in the interest of the traveling public, for which the service was first started. The board, at this meeting, should recommend a device which it has seen tried and proved, which recommendation will relieve owners and commanders of the responsibility and at the same time overcome the difficulty which vessel owners have heretofore had when looking for the best that is to be had for the equipment of their boats."

LUMBER CARRIERS APPEAR TO BE UNITED.

Owners of lumber vessels who attended the meeting of lumber-carrying interests, that followed the annual meeting of the Lake Carriers' Association in Detroit last week, are generally of the opinion that some of the disadvantages under which they have been trying to operate their vessels in the past will be removed by united effort. The owners of lumber vessels are especially pleased with the personnel of the governing committee selected at Detroit. This committee, which will be practically in control of the vessels if an agreement is entered into by all the owners, is composed of F. W. Gilchrist of Alpena, C. H. Prescott and Wm. Teare of Cleveland, Edward Hines of Chicago, Henry McMorran of Port Huron, O. W. Blodgett of Bay City, Alexander Sinclair of Duluth, M. Sicken of Marine City, C. I. Rowland of Toledo and C. M. Zangerle of Detroit. Mr. F. W. Gilchrist of Alpena, who represents very large interests, has taken a decided interest in perfecting the new organization, and it is a source of special gratification to some of the owners of lumber carriers to find that O. W. Blodgett of Bay City and Edward Hines of Chicago are earnestly supporting the organization movement this year.

The navy department has issued orders directing Capt. C. H. Stockton to proceed to Manila, P. I., and take command of the battleship Kentucky, which is now nearing the completion of her voyage over from the United States to the Asiatic station. Capt. Stockton will depart for his new station on the steamer leaving San Francisco on Feb. 1 next.

Wm. G. Gray, who has been assistant to General Manager Swank of the American Iron & Steel Association for a number of years, has been appointed statistician of the association. Mr. Gray is now supervising also the collection of the iron and steel statistics for the census of 1900.

The Atlantic Works, Incorporated, of Philadelphia, a short time ago shipped one of their B17 adjustable bevel band saw machines to Messrs. H. Elderkin & Co. of Port Greville, Nova Scotia.

BENEFIT FUND FOR LAKE SEAMEN.

OUTLINE OF GENERAL FEATURES OF THE SCHEME AS DEVELOPED BY COMMITTEE APPOINTED AT THE ANNUAL MEETING OF THE LAKE CARRIERS' ASSOCIATION—IF ALL EMPLOYES WERE INCLUDED, RECEIPTS WOULD AGGREGATE MORE THAN $75,000.

The committee appointed at the annual meeting of the Lake Carriers' Association in Detroit last week, to organize a federation of employes on vessels affiliated with the association, providing for the payment of benefits to such employes in cases of accidental death or disablement, has been diligently at work. It is hoped that the fund will tend to retain steady and reliable men in the service of the vessel owners and will gradually lead to a general improvement in the class of men employed. The committee consists of F. J. Firth of Philadelphia, G. L. Douglass, Chas. H. Keep and W. C. Farrington of Buffalo, H. Coulby, E. S. Mills, J. A. McGean, H. A. Hawgood, J. H. Sheadle, J. C. Gilchrist, Geo. P. McKay and Harvey D. Goulder of Cleveland, A. B. Wolvin of Duluth, A. W. Colton of Toledo, C. W. Elphicke of Chicago, David Vance of Milwaukee, Thos. Cranage of Bay City, and A. A. Parker of Detroit.

A sub-committee selected from the larger committee just named has outlined the general features of the proposed organization, which will be submitted, of course, in writing to all members of the Lake Carriers' Association before final action is taken. The sub-committee's report includes also a rough estimate of receipts and disbursements, based on the possibility of the entire force of men (about 9,000) joining the fund in the first year. The outline of general features and the estimate of finances follows:

1. A board of five trustees to be formed to administer the fund and conduct the affairs of the federation.

2. For the purpose of providing a fund for the payment of benefits in case of accidental death or disabling injury to employes on lake vessels, the vessel owner shall pay to the trustees 1 cent a ton on his net enrolled vessel tonnage; and shall also pay from time to time through the season 1 cent per man per day for each benefit book held by men employed on his own vessels, being 50 per cent. of the rate currently to be paid into the fund by the men themselves.

3. Any man employed upon any vessel in the Lake Carriers' Association will upon application be supplied with benefit book, and, as the committee shall finally determine, there may be an arrangement by which men in the higher grades of employment may have two or three benefits, paying proportionately, and so long as he complies with the rules and regulations and makes the payment as therein provided, he will be a member of the federation and entitled to all benefits accruing from such membership, which benefits shall include, so far as possible, a preference of employment upon vessels of the Lake Carriers' Association.

4. The total fund thus created by contribution from owners and employes will be liable to the full amount thereof, and no more, for stipulated payments to be made upon the death or the permanent or temporary disability from accident of members of the federation, provided such accident clearly arises out of the employment of such member on a vessel of the Lake Carriers' Association.

5. Any member of the federation may also, if he so desires, be a member of any other beneficial association or union.

6. No vessel owner shall incur any liability as the result of the federation plan beyond the exact payments stipulated to be made by him as aforesaid.

7. No vessel owner will be bound by his assent hereto unless at least 90 per cent. of the entire tonnage represented by the members of the Lake Carriers' Association has assented hereto.

8. Upon the assent of not less than 90 per cent. of the tonnage aforesaid the committee above referred to shall be thereby authorized to proceed at once, under advice of Harvey D. Goulder, counsel of the association, to perfect the plan of federation in its full detail and to make it effective on April 1, 1901, or as soon thereafter as may be found practicable.

A rough estimate of the amount which might be collected and disbursed in connection with the benefit fund as outlined in the foregoing paragraphs is as follows:

On a steamer employing twenty men for a round trip of eleven days there would be collected from the men, if all joined the fund	$4.40
Added by the master or owner	2.20
Total remittance from master for trip	$6.60
Nine thousand men employed on Lake Carriers' Association vessels for a season of 220 days, on basis of 2 cents per day, would be	$39,600
Fifty per cent. thereof added by owners	19,800
Paid by men for taking out 9,000 books	9,000
Paid by owners, 1 cent per ton assessment on 900,000 tons	9,000
Total	$77,400

To the foregoing should be added extra amounts contributed by men and owners on account of privilege availed of to take double or treble benefits.

ROUGH ESTIMATE OF DISBURSEMENTS.

Casualties on great lakes resulting in death estimated at 110, of which 50 per cent. were employed on Lake Carriers' vessels; fifty-five death benefits at $400 each	$22,000
Assumed that 10 per cent. of men employed on Lake Carriers' vessels met with injury entitling them to four weeks' benefits, there would be 900 men at $5 per week for four weeks	18,000
Estimated expense of administering fund	7,500
Total disbursements	$47,500
Estimated surplus	$29,900
Total amount contributed by owners	$28,800

It will be noted that the period of disablement benefits at $5 per week is limited to four weeks. As it is usual in accident insurance to have the benefits extend over a longer period than four weeks, it is quite probable that this will be changed before the scheme goes into effect.

HARD COAL SHIPMENTS FROM BUFFALO.

There is presented herewith a statement of hard coal shipments out of Buffalo from 1873 to 1900 inclusive. The figures are not those of the customs officials. They are from the coal shippers themselves, and are correct.

HARD COAL SHIPMENTS FROM BUFFALO.

Year.	Net tons.	Year.	Net tons.
1873	570,440	1887	1,904,060
1874	384,500	1888	2,556,270
1875	439,730	1889	2,156,670
1876	361,480	1890	2,044,134
1877	455,070	1891	2,365,895
1878	331,170	1892	2,852,330
1879	580,640	1893	2,703,673
1880	589,670	1894	2,485,255
1881	825,240	1895	2,688,076
1882	1,027,500	1896	2,242,326
1883	1,467,778	1897	2,638,076
1884	1,305,410	1898	2,331,199
1885	1,506,000	1899	2,808,898
1886	1,562,060	1900	1,937,811

It will be noted that the largest shipments were made in 1892, but the record of that year was nearly equaled in 1899, due mainly to the fact that it was impossible to get cars enough in 1899 to care for the rail trade. But since 1892 the rail shipments of hard coal to Chicago have steadily increased and that without much regard to lake shipments. Last year, of course, the rail shipments to Chicago were materially reduced on account of the hard coal miners' strike, and the lake shipments were also reduced from the same cause. The total shipments by rail to Chicago in 1899 were 918,982 tons, and in 1900 653,904 tons. The table is not very encouraging to the vessel owner, for it is apparent that in all probability the hard coal shipments from Buffalo have about reached their maximum.

As regards lake freights for 1900, it has been found that the averages, based on tonnage figures (not averages of rates prevailing from day to day) were: Chicago, 53.36 cents; Milwaukee, 52.4 cents; Duluth, 41.35.

Changes in freights throughout the season and average rates by months were:

Chicago: Changes throughout the season—April 7, 75 cents; June 18, 65; July 13, 50; July 23, 40; Aug. 11, 30; Nov. 22, 50; Nov. 27, 75. Average by months—April, 75 cents; May, 75; June, 68.4; July, 54.47; August, 33.5; September, 30; October, 30; November, 43.6; December, 75.

Milwaukee: Changes throughout the season—April 7, 70 cents; June 18, 60; July 13, 50; July 23, 40; Aug. 11, 30; Nov. 22, 50; Nov. 27, 75. Average by months—April, 70 cents; May, 70; June, 63.4; July, 56.59; August, 34; September, 30; October, 30; November, 41.8; December, 75.

Duluth: Changes throughout the season—April 7, 50 cents; June 16, 40; July 27, 35; Aug. 11, 30; Nov. 28, 75. Average by months—April, 50 cents; May, 50; June, 45.28; July, 39.7; August, 31.4; September, 30; October, 30; November, 30; December, 75.

EQUAL RIGHTS IN DULUTH SHIP-CANAL.

The case of the Butler-Ryan company against E. T. Williams & Sons, in the state court at Duluth, was decided Monday in favor of the plaintiff, the jury bringing in a verdict of $1,640. The case has involved much of interest and importance to vesselmen, as the result would determine the respective rights of lake boats and the dredges, tugs and scows in the use of the Duluth ship-canal. The court holds that the rights are equal. It has been contended by dredge operators that steamers should wait for the tugs and their scows when the latter were in the canal and bound out toward the lake. Judge Cant holds that the dredge tugs are to so handle their scows that there will at all times be sufficient room for the free movement of lake boats.

In the case that has just been determined, the Butler-Ryan company, which has a contract for the construction of the substructure of the northerly pier of the ship-canal, brought suit against E. T. Williams & Sons to recover for damage done to newly driven piling by the cargo steamer M. B. Grover. The accident happened in 1899. The story of the case is that the steamer was incoming and the tug Martin, towing a scow, was bound outward, and they met in the canal. The scow was attached to the tug by a rather long line, in consequence of which the former sheered from side to side considerably. This action on the part of the scow was influenced to some extent by a strong current which ran in from the lake toward the harbor. As the steamer and scow approached each other the latter sheered over toward the former. The master of the steamer saw that a collision with the scow was inevitable unless he should run his boat into a row of piling on the north side of the canal, and this he did. The piling had been placed by the Butler-Ryan company, and after investigating the circumstances the latter brought suit against the owners of the tug and scow instead of the steamboat.

The gist of the decision is that tugs handling scows must keep them under control in the Duluth ship-canal, and that steamboats have equal rights in that waterway with tugs and scows at all times. S. D. Allen and Searle & Spencer were attorneys for the plaintiff and Baldwin & Baldwin and John Norton were attorneys for the defendant.

The Pere Marquette Railway Co.'s car ferry Pere Marquette, engaged in transporting railway cars across Lake Michigan, crossed that lake last year 1,008 times, which constitutes 504 round trips. Of this number all were made to Manitowoc from Ludington and return with the exception of sixty-five to Milwaukee, and five which were known as mixed trips, including stops at Manitowoc, Milwaukee and Chicago. The distance covered aggregates 68,857 miles, the distance being 120 miles for the round trip. The schedule time for the ferry across the lake from Manitowoc to Ludington is 4 hours and 45 minutes, but the steamer has made the run in 4 hours and 10 minutes. With a capacity of thirty cars per trip it is figured that she carried across the lake both ways 30,240 cars, or a string 250 miles long.

The North German Lloyd Co. has now under construction fifteen steamships. Six of them are for the Mediterranean trade and two of them are to outclass the Deutschland and Kaiser Wilhelm der Grosse.

POSITION OF THE NAVAL ENGINEER.

FOLLOWING THE LEAD OF AMERICA HE IS DEMANDING EXECUTIVE RANK AND EXECUTIVE TITLE IN THE BRITISH NAVY—NO PLACE ON THE MODERN MAN-OF-WAR, HE SAYS, FOR THE SAILOR AS HE HAS BEEN KNOWN IN THE PAST.

Mr. D. B. Morison contributes to the Institution of Engineers and Ship Builders of Scotland an article upon the subject "Engineering Crisis in the Navy," in which he devotes considerable attention to Rear Admiral Melville's remarks upon the operation of the personnel bill in the United States navy. He says that the unjust and prejudiced policy of repression, which it has always been a tradition of the British admiralty to adopt towards the engineering branch of the service, is gradually sapping its efficiency by killing the enthusiasm and contentment of the personnel and by rendering it unpopular and unattractive in those circles in which the best class of engineer officer could and should be recruited. Continuing he says:

"In these days, when engineering science is the very foundation of civilized existence, it is foolish and hopelessly futile to attempt to repress its professional representatives by any artifices of social or service convention. The evils attending the efforts of the admiralty in this direction are growing in an increasing ratio with every development of engineering that increases its influence upon sea power. The variety, complexity and magnitude of the machinery employed upon modern warships renders it essential that those responsible for its care and manipulation shall possess high professional attainments, whilst the successful organization and management of the large engine room staffs now required call for administrative capacity of no mean order. It is surely unreasonable to expect that the well-bred, high-spirited and capable youths who are therefore alone fitted to become efficient engineer officers, will willingly enter a service where they will be subjected to continual annoyance and humiliation, and where their ultimate grave responsibilities will be unaccompanied by corresponding powers of control. There is a tendency on the part of some of the opponents of reform to make capital out of certain statements made by Rear Admiral Melville (in his able and remarkably frank report for 1900, as the chief of the bureau of steam engineering of the United States navy), with reference to the unsatisfactory working of the new personnel act, by which the former line and engineer corps of the United States navy were amalgamated. There is, however, no justification for interpreting the words of Rear Admiral Melville as a condemnation of the enlightened and liberal policy of which the personnel bill was the practical expression. In order to prove this point I cannot do better than quote Rear Admiral Melville's own words:

"'I am fully aware of the futility and folly of decrying legislation simply because the desired results therefrom do not promptly materialize, but surely time enough has now elapsed since the enactment of the reorganization scheme to make criticism of its effects upon the navy both proper and important. To any close observer it is convincingly evident that either the scheme was a mistake, or that the proper course has not been taken to carry out its intent. I am free to acknowledge that the events of the past year have brought only discouragement to those most deeply interested in a successful outcome of this new law, but I am equally candid in the belief that the cause of this discouragement lies not in the scheme itself, but in a lack of full appreciation on the part of the department (navy department) of the urgency of the need for haste, not only in providing the fullest opportunity for the acquirement of practical engineering knowledge on the part of the younger officers of the former line, but in enforcing their embracement of this opportunity in the most effective manner by departmental orders. It will not do to depend upon unaided individual enthusiasm, or details occasioned by the necessities of particular ships; such a course merely temporizes with the present needs, fails in any rational degree to increase the force of navy engineers (even should it suffice to replace the annual loss), and is hopelessly ineffective to secure the most desirable results in the shape of a speedy acquirement of general knowledge of engineering on the part of the new line as a whole.'

"'Regarding the engineering departments of ships at sea in times of peace as well as of war, compare for a moment the advantage of a battleship depending for the full and proper operations of her motive power upon the knowledge of a single officer, the chief engineer, with that of another ship of the same class, whereon any one of the line officers could in an emergency take efficient charge of the machinery and several, indeed, assume and completely fill the position of an expert in that department. The ideal condition of the latter is what we are now striving for, since engineering knowledge has been recognized as of the most vital importance in the service, and it is to the realization of this I will hopefully look despite the many visible obstacles.'

"In reading Rear Admiral Melville's valuable and lucid report," Mr. Morrison continues, "one cannot help feeling that it would be to the advantage of our public services, and therefore of the nation, if it were possible for the heads of our naval departments to make public, in the same complete, frank and decisive manner, the results of each year's working, and the bearing which the experience gained had upon the creation of greater efficiency. One inestimable advantage attending such published reports lies in the fixing of the responsibility upon individuals rather than upon an unarraignable and intangible system. That the engineering difficulties in the navy, with which we are now face to face, are typical and not accidental; that they are simply an acute and critical stage in a process of evolution, and not merely the outcome of certain special features of our naval administration, is proved by the fact that the same difficulties are arising in all the progressive navies of the world. The United States navy was the first to reach an acute stage of the trouble which, in the judgment of the very progressive and decisive American people, demanded the immediate application of measures for its redress. We appear to be the next to experience the grave dangers attending the failure to harmonize personnel and material. The others will undoubtedly follow in due course, and in view of the vast amount of world wide attention which the whole subject is now attracting, progress is likely to be rapid, and we must take care that we are not left behind in the race for the acquisition of the enormous advantages which, in warfare, will accrue to the navy possessing the most efficient organization.

"The first step towards reform is a frank and intelligent recognition of the obvious fact that the great changes of the last fifty years, under which our warships have become floating machines, necessarily involve sweeping changes in the organization and training of the naval personnel. The required standard of increased efficiency may perhaps entail some additional expenditure, but there are so many possibilities of effecting economies by means of reforms in our whole system of naval administration, that it would appear more than likely that vastly increased naval efficiency could be obtained at an annual expenditure not exceeding that which is at present incurred for the maintenance of a navy which is in a chronic state of unpreparedness for actual warfare. In our dockyards, the cost of production could be greatly reduced, and enormous sums of money saved annually, by the erection of modern tools and equipment, and the adoption of an organization and methods more nearly akin to those obtaining in the commercial engineering world, and which have been evolved under the law of the survival of the fittest. Some of the savings thus effected could be advantageously devoted to increasing the efficiency of the personnel, by offering the requisite inducements to the best class of men of all ranks and ratings. To those who have the maintenance of our maritime supremacy at heart, it is satisfactory to note that, during the past few months, evidence has been forthcoming that the necessities of the case are being felt in some influential quarters, and I do not think it is too much to hope that the pendulum is about to swing. In support of this belief, I would quote the utterances of two distinguished admirals, whose opinions cannot but carry great weight in naval and administrative circles. Rear Admiral FitzGerald, in the course of an able article, entitled 'Training of Seamen in the Royal Navy,' which he contributed to the National Review for June, 1900, makes the following significant statements:

"'The navy has made great strides in the direction of becoming a mechanical profession since Sir Geoffrey Hornby's day. Almost everything is now done on board a man-of-war by machinery; manual labor is nothing; and the tendency is to increase the machinery, and to do nothing by hand which can be done by steam, electricity or hydraulics. Not only the motive power, but the fighting power of our ships is all machinery. In the old days 'Jack' could repair all ordinary damages himself, and by the exercise of his 'profession' he could keep the ship as a 'going concern' for many months, and sometimes for years, without falling back upon a dock yard. Now he has practically nothing to do with the up-keep of the ship, because it has nothing to do with what we are still asked to believe is 'his profession,' and the ship can only be kept as a going concern by the engineers, the E. R. A.'s, the stoker-mechanics, the armorers, the specially instructed electricians, and in short, by that large class in the complement of a warship which we may properly call artificers. These men and these men alone can maintain for one week, or for one day, the fighting efficiency of a modern battleship or cruiser, or even a torpedo boat destroyer, and the consequence is that 'Jack' finds his general utility impaired because he is not a mechanic; his education has been faulty, and he has not learnt 'his profession,' so Sir Gerald Noel and some of his friends propose to improve his education by sending him to battle with the elements in an obsolete type of ship. This I consider to be illogical, because I see that 'Jack's' power to defeat the enemies of his country is entirely dependent upon his ability to manipulate skilfully various delicate machines (including the guns themselves), which require considerable mechanical knowledge and skill to work them to the best advantage. Already the engineers are calling out for executive rank and executive titles. This is quite natural, as they see that they do most of the work, and the maintenance of our modern ships in a state of fighting efficiency is the business of mechanics and not of sailors. I do not think the engineers will get their wish just at present, but this agitation is a sign of the times which must not be ignored; and it is not difficult to foresee that unless our executive—both officers and men—receive a more mechanical training than they do at present, they will be gradually ousted by the engineers and artificers. The law of the survival of the fittest is a universal one, and the navy will be no exception to it. The 'sailor,' as we have hitherto known him, cannot survive long, as there is no place for him on board a modern man-of-war. Steam and machinery have battled with the elements, and defeated them far more signally than ever the Jack Tar did in his palmiest days, and the caricature of him which we have been vainly striving to keep up for the last twenty or thirty years must now pass away. I do not feel called upon to produce forthwith a cut-and-dried scheme for our future training service; but that a complete revolution in it, from the day the boys are first entered from the shore, is absolutely necessary I have no doubt, that is to say if we are to keep pace with the times, and not see ourselves surpassed by other and more intelligent nations while we are crying over spilt milk. That the new training must be largely of a mechanical nature seems to me to go without saying, and that the manipulation of masts and sails can have no logical place in it ought, I think, to be equally obvious to all unprejudiced minds.'

Mr. Morrison concludes that such utterances from such quarters may be regarded as marking the birth of a new epoch in the history of the British navy. "It is to be sincerely hoped," he says, "that the younger officers of the executive branch will not fail to follow in the footsteps of those senior officers of high rank who, in spite of all the deterring influences of that conservatism and affection for the traditions of the past which are inseparable from age, have had the intelligence, courage and honesty to recognize the fact that the old days are no more, and that new conditions demand new methods. The time has, however, not yet arrived for any relaxation of effort on the part of those who have identified themselves with the active advocacy of reforms; rather is it necessary that yet more determined and sustained efforts should be made to stimulate the interest of the nation in the question, and to educate public opinion as to the facts and necessities of the case. I, therefore, appeal to the members of this and kindred institutions, and to the engineers of this country as a body, to give their close attention to this vitally important subject, and to give expression to a collective and authoritative opinion, that cannot fail to impress the public mind, and materially assist towards the institution of those far-reaching reforms, which are absolutely essential if, on the eve of war, and in answer to the anxious enquiry of the nation, the navy is to be in a position to cry 'All's well.'"

OPPOSED TO CONSOLIDATION OF BUREAUS.

Rear Admiral Bradford, chief of the navy bureau of equipment, has submitted his views in opposition to the plan of the navy department for the consolidation of the bureaus of steam navigation, of equipment and of construction and repair. His statement is as follows:

"I believe it would be very detrimental to the interests of the navy if the bureaus proposed were consolidated, and I will give in writing some reasons for this opinion. During the revolutionary war and until the year 1789 the navy suffered many vicissitudes of direction, being at different times under the charge of a 'marine committee,' a 'naval marine committee,' a 'continental navy board,' a 'board of admiralty,' and 'agent of marine,' etc. It was universally admitted that these various authorities constituted by congress to administer upon the navy lacked sufficient professional knowledge to successfully perform the task alloted. In 1789 a war department was created, and both the land and naval forces placed under it. The war department continued to administer upon naval affairs until 1798, when congress established a navy department. It was stated in congress during a discussion of the act that it was necessary 'from a want of knowledge of naval affairs in the war department.' The navy department first consisted of a secretary of the navy, a chief clerk and such other clerks as were necessary. This organization continued until 1815, when by act of congress a board of navy commissioners, consisting of three captains, the highest grade then in the navy, was authorized for the purpose of assisting the secretary of the navy in the discharge of his ministerial duties, and for the express purpose of taking charge of all matters in reference to the construction, armament and equipment of ships of war. The secretary, in asking for a change in the organization of the navy department, expressly stated that 'the multifarious concerns of the naval establishment, the absence of wholesome regulations in its civil administration, and the imperfect execution of duties, owing to want of professional experience, led to confusion, abuse and waste.' The members of the board of navy commissioners were appointed by the president and subject to confirmation by the senate.

"This organization continued for a period of twenty-seven years and was far more efficient than any previous organization. The mistake was made, however, of requiring the three navy commissioners to act as a unit, thereby greatly limiting their capacity. In 1842 the department was again reorganized. After much discussion and debate a system of seven bureaus (practically the same as at present with the exception of steam engineering) was recommended by the board of navy commissioners to the secretary and by him to congress. A bill providing for such an organization passed the senate and was recommended by the naval committee of the house. The house, however, reduced the seven bureaus to five by combining the bureaus of ordnance and hydrography and equipment and construction and repair. When the organization was complete the department was divided into the following five bureaus: Yards and docks; construction, equipment and repair; provisions and clothing; ordnance and hydrography; medicine and surgery. A captain was made the chief of each bureau, with the exception of provisions and clothing and medicine and surgery. This organization was not satisfactory to the secretary of the navy, who continued to recommend the seven bureaus proposed in 1842. Secretary Upshur, in discussing it in his report, after it had been in operation about six months, made use of the following language:

"The law for the reorganization of this department has been carried out as far as it has been found practicable. The advantages of this change in the increased facilities of transacting business and in the concentration of responsibilities are manifest and great. I regret to say, however, that the system is yet very imperfect. The bill as it passed the senate (providing for seven bureaus) would, it is believed, have proved as complete and effective in its provisions as could reasonably be expected of any new measure running so much into details, but the changes made in it by the house of representatives (combining equipment with construction and repairs and ordnance with hydrography) have produced difficulties and embarrassments in practice which were not foreseen at the time. The bureau of construction and repairs, for instance, is charged with the duties of the bureau of equipment. It requires a ship carpenter to build or repair a vessel of war; it requires a naval officer to equip her. It would probably be impossible to find any one man properly equipped to perform all the duties of building, repairing and equipping a vessel of war. In providing a chief for the bureau of construction, equipment and repairs the alternative lay between a naval captain qualified to equip and a naval constructor qualified to build and repair. I did not hesitate to prefer the former, and the place is filled by a member of the late 'board of navy commissioners.'

"Owing to the increasing importance of steam machinery, Charles H. Haswell, a navy engineer, was attached to the bureau of construction, equipment and repairs in 1846, and that bureau continued to perform the duties of the bureau of steam engineering until 1862. In 1853 John Lenthall, a naval constructor, was appointed chief of bureau of construction, equipment and repairs, a captain having previously been chief of that bureau. In accordance with the recommendation of Secretary Welles and preceding secretaries, a bill for the reorganization of the navy department was introduced in congress in 1862. Senator Grimes, then chairman of the senate naval committee, in presenting the bill to the senate had a statement printed to the effect that the granting of three additional bureaus would actually cause 'a diminution of the expenses of the government' and the naval service 'be made much more efficient.' The bill passed both houses and was approved July, 1862. The new bureaus created were the bureau of navigation, bureau of equipment and bureau of steam engineering. This organization has continued to the present time.

"It appears, therefore, that the proposition now made to consolidate the bureaus of construction and repair, steam engineering and equipment is one that has been tried and found unsatisfactory. In fact, the lesson to be learned from the changes in the organization of the navy department at various times is that expansion and specialization, rather than contraction and generalization, are necessary as the navy is enlarged. Since 1815 three officers of command rank have been in the councils of the navy department. In this respect there has been no increase, there being the same number now, all captains, but holding the rank of rear admiral while chiefs of bureaus. Should the three bureaus be consolidated as proposed, the chief thereof could not even read his mail, and he would be in the hands of subordinates without responsibility. Figures are often given to prove that a consolidation of bureaus will result in economy by decreasing the number of employes. It is not claimed that an unnecessary number of employes exists now, and it is difficult to understand how a consolidation will decrease the amount of work to be performed."

DREDGE FOR CANADIAN GOVERNMENT.

The Polson Iron Works, Toronto, is building for the Dominion government self-propelling hydraulic dredge which is to be transported to the Pacific coast in sections and completed there during the year. The dredge will be capable of working to a depth of 40 ft. below the water surface and excavating any ordinary material, discharging it by either of three methods, viz., first, to shore through a long-distance pontoon pipe; second, through a suspended side-discharge pipe, 85 ft. long, and third, into scows alongside. It is self-propelling at a speed of eight statute miles an hour. It is fitted with crew's quarters on the upper deck sufficient to accommodate twenty men. The machinery and equipment is first-class in every respect and of a substantial description. The dredger, as a whole, is made of the very best materials and workmanship and adapted for permanent service in either fresh or salt water.

The hull is 125 ft. long, 32 ft. wide, and 7 ft. 6 in. deep at the side. It is square ended at bow and stern for the purpose of carrying the suction pipe and stern wheel respectively, but has a rake on the underwater body forward and aft, and round bilges, making the vessel easy to propel. The construction of the hull is composite, that is to say, it has steel frames and trusses over the entire length with the planking and sheathing of wood, by which great strength is obtained, the steel frames being practically indestructible, while the planking can be readily and cheaply renewed at any time when necessary from injury or decay. The hull is stiffened by two internal trusses extended the whole length of the boat, which also serves to carry the deck house and sustain the weight and thrust of the front A frame. This also furnishes the necessary support for the wheel beams at the after end. There are four watertight steel bulkheads, and each compartment is fitted with means of removing the bilge water independently. The keel is ingeniously constructed in the form of a gutter, which drains the perfectly flat bottom of the vessel completely and forms an efficient well for the pump suctions.

The main engines for driving the dredging pump are of the vertical triple expansion type—13½, 22 and 36 by 21 in. stroke of the standard marine type. The main dredging pump is centrifugal of improved type, having 20 in. diameter suction and discharge. The suction pipe is designed to make a cut 50 ft. wide when stationary and 175 ft. wide when swinging on the stern spud. A complete outfit of auxiliary machinery is provided for handling the suction pipe, spuds, anchors, hull, etc. The two boilers are of the Heine water-tube type, having 3,000 ft. of heating surface. The builders guarantee that the dredger is capable of doing effective work at 1,500 ft. distance from discharge with only one boiler in operation. There is a surface condenser of the latest and best construction, having 1,200 sq. ft. of surface. The vessel is propelled by a stern wheel 20 ft. diameter, driven by double-horizontal engines 16 in. diameter and 72 in. stroke, of the Polson Iron Works standard patterns, which have been thoroughly tested in service. The hull will be ready for shipment the latter part of January and will be erected in New Westminster and completed there by W. E. Redway, the superintendent of the ship building department of the Polson Iron Works.

NOTES FROM COAST SHIP YARDS.

Boothbay, Me., is having particularly good fortune in having its ship yards, so long still, resounding with the tools of a large force of workmen. Irving Adams has contracted to build two large first-class fishermen for S. Nickerson & Sons of Boothbay Harbor, and has a large crew of skilled workmen in his yard. He also is under contract to put a piece in a steamer, and to build a small vessel for another party. Hodgdon Bros. have contracted to build two vessels for Massachusetts owners, and have refused to take other orders. Ship carpenters are in great demand, and the supply is far less than the need.

Sawyer Bros. are making preparations to soon begin work in their yard at Milbridge, Me. Material for a three-masted schooner, the first craft of the build, is arriving quite rapidly. These builders are in receipt of applications for two other schooners, one of 600 tons, the other a duplicate of the three-master, the keel of which will be laid the last of the month.

Kelley, Spear & Co. of Bath, Me., have completed arrangements with Capt. F. J. Hinckley and others of Bath, to build a 700-ton four-masted schooner which shall be ready for launching in the spring. This vessel is designed to compete for the large class of trade which the big wooden vessels constructed in Maine yards of late are too large.

The construction of the new battleship Maine at Cramps' ship yard, Philadelphia, has become a race with time, eagerly watched by naval officers and ship builders. To have the vessel ready to take the water on Feb. 15, the third anniversary of the destruction of the Maine in Havana harbor, is requiring the ship yard to work night and day.

Work is being rushed at the ship yard of the William R. Trigg Co., Richmond, Va. The keel of the cruiser Galveston will be laid next week, and the Shubrick, torpedo boat, will soon undergo her builders' trial. The next launching will be the revenue cutter Mackinaw.

The Philadelphia & Reading Railway is about to place an order with the Harlan & Hollingsworth Co., Wilmington, Del., for the construction of a ferry boat similar to the Philadelphia, to be used in connection with the Kaighn's Point service.

A five-masted schooner, the Oakley C. Curtis, was launched from the yard of Percy & Small, Bath, Me., last Saturday. A special train from Portland was run for the occasion. The vessel measures 2,374 tons, gross.

C. E. Fulton of Fairhaven, Wash., is contemplating establishing a ship yard at Fairhaven. He has approached the Commercial club of that city upon the subject and has already secured two contracts.

Green Bros., Bridgeport, Conn., are building an oyster boat for Jeremiah Smith & Sons of City Point, Mass. She will be a combination freighter and dredger and will cost about $20,000.

MARINE REVIEW

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To All Old Sailing Masters on the Great Lakes.

The Marine Review is desirous of obtaining the experiences of old sailing masters on the lakes and the histories of the old vessels which they sailed, together with photographs or pictures of them and their craft. These old sailing masters and their vessels are a part of the history of the great lakes which is fast becoming obliterated by the revolution in lake transportation. This history is of a perishable nature because it exists largely in the memories of men who have spent the greater part of their lives on the lakes. If it is not preserved now it never will be preserved. The Marine Review therefore begs old captains and mates and vessel owners to write a brief account of their lives, their experiences on the lakes and the histories of the vessels upon which they sailed. The Review will both publish and pay for the matter. Never mind spelling, punctuation and diction; the Review will furnish those; just relate the facts. The Review hopes that every old sailing master will take this as an appeal to him personally and jot down during his winter evenings a rough sketch of his life. For instance, but little is known about Lake Superior navigation prior to the opening of the Sault Ste. Marie canal. Who knows about it? Has anyone any pictures of the vessels afloat on Lake Superior at that time. If so, send them to the Review to be photographed and they will be promptly returned in good condition. By the same token, does anyone know of the first steamboat line that ran between Detroit and the Sault?

The confidence with which Senators Hanna and Frye approach the subject of the shipping bill in public interviews inspires one with the hope that it may yet be passed during the present session of congress. They may have a clearer view of conditions than laymen, but assuredly to the layman there is nothing in the external view of things to justify the prediction that the bill will pass. The great element of danger lies in the fact that there are only thirty-one legislative days left to the session and that many bills, which it is imperative must be passed before the session comes to a close, have not yet even been reached. Added to this limitation of time is the undoubted fact that filibustering will be resorted to by the opponents of the bill, a circumstance which cannot be prevented, in the senate at least. The singular thing is that the opponents of the bill admit that something should be done to strengthen the merchant marine, and yet they have no substitute to propose, unless Senator Vest's free ship bill may be regarded as a substitute. Upon this point Senator Aldrich, who was at one time regarded as opposed to the bill, says:

"There is some difference of opinion as to what should be done, but, as I understand it, there is no difference whatever, at least among Republicans, as to the necessity of doing something. I do not see anybody who is opposing this measure offering anything better. It is like a tariff bill. We hear of a great outcry against such bills, but we never get any substitutes except those offered by free traders and Democrats, which would be utterly ruinous to the country. The only substitute that I know of to the existing bill is the free ship bill offered by Mr. Vest. There is the same difference between the bill offered by the senate committee on commerce and the free ship bill offered by Mr. Vest that there is between the Republican tariff bills and the Democratic free trade bills. We have got to the pass when something must be done, not only to preserve what little shipping we have in the foreign trade, but to increase it. The bill in the senate may perhaps be amended to advantage. I cannot tell fully as to that, but we need some bill, and this one is the best bill on the subject that has been brought before congress."

The measure as reported by the committee on commerce has been strengthened by two amendments made during the week, one of which extends the benefits of the bill to ships engaged both in the foreign and coastwise trade, such as those of the Panama railroad line, subsidy being granted to the extent that the cargo is foreign. Another amendment permits a majority of the owners of a steamship to sign contracts with the secretary of the treasury, instead of requiring all the owners to sign; and in lieu of a bond the secretary is authorized to retain 25 per cent. of earned compensation as security for the performance of the contract. Senator Frye is devoting considerable time to perfecting the bill and to weighing suggestions for amendment which are proposed by those who have studied the subject. He thinks the bill today is as nearly perfect as any measure can be which has not received the advantage of a practical test.

The obstacles now in the path of the bill are parliamentary, a condition which has obtained since the bill was displaced from the position of "unfinished business." It must contest for the right of way with the army reorganization bill, the legislative appropriation bill, the war revenue reduction bill, the great river and harbor bill, the Nicaraguan canal bill, and ten other appropriation bills, the failure of any one of which will entail an extra session of congress. Altogether the evidence in the case does not lead to as cheerful a conclusion as the sponsors of the bill would have one believe.

EDUCATION OF THE JUDGMENT.

NEED OF IT IN DEALING WITH TECHNICAL MATTERS—CHARACTERISTIC PAPER FROM THE GENERAL MANAGER OF THE UNION IRON WORKS.

BY GEO. W DICKEY.*

Of all teachable things, the education of the judgment receives the least attention, while its importance is supreme. I do not know of a single university that has a chair of common sense, and in trying to reason out why this so important endowment is not taught I can think of but one reason, and that is the impossibility of finding a man to fill such a chair. Men in all professions are therefore left to acquire this most important part of their education as they acquire practical experience, and in most cases with as little success. It is an unfortunate condition with us that we are nearing the end of our work before we realize how important a factor judgment is in all questions of importance that come before us in our every day experience. Self education in the matter of judgment is a life-long mental discipline. One of the most important points in this process is very difficult to deal with, for every time it comes up it involves us in an internal struggle which equally affects our vanity and our ease.

This point consists in the tendency to self-deception in regard to the result we wish for. For any one who is not brought daily to the necessity of self-correction in regard to this tendency, it is impossible to realize how all-powerful the tendency is, and how unconsciously we all yield to it. How eager we all are to seek for such evidence as may be in favor of what we want the result to be and to disregard any evidence pointing the other way. We receive as friendly that which agrees with our preconceived notions, and resist and dislike that which opposes them. In fact, the inclinations we exhibit to receive and to act upon any report or opinion that harmonizes with our preconceived notions can be compared, in degree, only with the incredulity we entertain toward everything that opposes them. And all this goes on unconsciously, while we honestly believe that our judgment is entirely free and unbiased. It is my purpose to try, in as simple and direct language as I am able to use, to point out some of the ways in which we fail to exhibit sound judgment in dealing with the engineering problems that confront us every day.

In my work, how do I suffer from lack of judgment on the part of myself and those connected with me, and how could much of that suffering be avoided, thereby reaching results with less waste of labor and time? This is an inquiry worth making, even if the answer be not quite satisfactory. There is fast growing up a system which, if I understand the direction in which it is moving, proposes to dispense with the necessity for the exercise of judgment in dealing with everyday engineering problems. Young men without experience, and who have never had the chance to acquire an educated judgment, are, as a rule, put in charge of very important work, and a set of instructions is provided for their guidance, which instructions are supposed, if rightly carried out, to obviate the necessity for any exercise of judgment on the part of the person in charge. Those of us who are carrying out large contracts with the government and with some public companies find it hardly possible to get anything decided by sound judgment based on experience. I have often tried to reason from my own experience with young inspectors of work, but that kind of reasoning is not now admissible. Printed instructions are produced, with the intimation that these must be adhered to in every particular, the inspector having no discretion in the matter. I have often traced these printed instructions back to their source, and found the author to be a man whom I would not like to trust with doing the work covered by them. In mechanical engineering and kindred business, such as ship building, the great bulk of the designing is done by the contractor, all working plans being prepared by him. He is also held responsible for the result; yet all his plans must be submitted to a young and, from the very nature of the case, inexperienced inspector, who, however clever he may be in solving theoretical questions relating to the device in question, has never had to make those things himself and to be responsible for their working after being made, and for their costing no more than he said they would cost before he began. Now, the young inspector reads in his book of instructions, generally in a preface, that the object of printing these instructions is for the proper protection of the interests of the government. In a decision by the judge advocate of the United States navy I read the other day that the aim and intent of the wording of the specifications and contract for the building of a warship were solely to protect the interests of the government. Now, my idea has always been that the object of the specifications and contract, when fully carried out, was to produce the best possible warship of the kind specified; that there were two parties to the contract, and that the interests of one needed protection just as much as the other. The language used in the decision mentioned shows how difficult it is for an inspector to use sound judgment, even if he has it at his command. When a plan is presented to him by which you

*Read before the Technical Society of the Pacific Coast.

propose to carry out the object of the specification, he looks at it with the distrusting notion in his mind that you have used what skill you possess to design this part of the work as cheaply as possible, and that it is his business to stand between you and the object of your desire; and he will not reason with you as to the why and wherefore of your design without putting you on the defensive in regard to your own character instead of that of your design. And when he has found out where he can add something to your design, to increase its cost without spoiling it, he is very likely to do so, as he thereby tickles his own vanity by impressing you with his power and cuts you out of doing the thing with the simplicity and economy that you were planning for.

This shows the need of an educated judgment on the part of such an inspector. And of course it might be the other way. The contractor, in making his design, may allow his self-interest to rob him of all sound judgment, and his desire for a simple and cheap device may lead him into making something that would not properly meet the requirements of his contract. What is needed is an honest endeavor on both sides to cultivate the growth of a sound judgment that can decide technical questions altogether apart from the personal interests of the parties. In no question is sound judgment, based on long experience, more necessary than in the many disputes that arise regarding workmanship and material. Here, where an educated judgment is most required, we find that self-interest and hard and fast rules interfere most with its application. When I look back over the many battles I have had with inspectors who demanded their pound of flesh when it could not possibly be got without blood—sometimes all the judgment lacking on the one side, and sometimes the other—I wonder why we should continue beating the air over questions that with the exercise of a small amount of sound judgment would never be raised. A good many years ago, while in the casting yard one morning, I noticed a propeller casting, a solid cast wheel which had, as many of them are apt to have, some gas checks across the back. I did not consider that the small defect should be any reason for condemning the casting. That was my judgment. Perhaps I was assisted in forming this judgment by a strong desire to save the cost of another casting. When the superintending engineer of the company for which this wheel was made saw the casting, he promptly condemned it, and no amount of reasoning on my part could alter his judgment. There being no desire on his part to help his judgment to concur with mine, he would take no chances with a wheel having any visible defect. And he believed that my opinion was formed entirely on self-interest, while his was founded on the high plane of engineering prudence. In this particular case I thought it worth while to test the foundation upon which each of us based our judgment. So I said to him: "Your company pays for this wheel 9 cents a pound, and it costs my company 6 cents. If I make another, we will lose 3 cents a pound instead of making 3 cents a pound. Now, I think that I am right in claiming that the slight defect in this casting is no ground for condemnation, but in order to save actual loss your company can have the present wheel for 6 cents a pound."

"Well," said he, "now you're talking reasonably. I will see our people about it and let you know." Within an hour this wheel was accepted and went into service, and, so far as I know, had a long and useful life.

Now, I myself might have acted just as this engineer did, but the transaction illustrates how much we are all influenced by our own desires in these questions instead of by sound judgment, and how difficult it is to know when the decision is prompted by desire when we think we are exercising our judgment. Our whole modern method of testing and inspecting materials is founded on the belief that the faculty of judgment in an inspector is a dangerous thing, and that all excuse for its cultivation must be eliminated from his mental stock in trade. The other day I saw condemned and broken up a large bronze casting that had cost about $3,000, because the coupons or test pieces showed less tensile strength than the specifications required. The casting itself was perfectly sound and very tough; in fact, admirably suited for the purpose for which it was made, and not the slightest doubt of its character was expressed by any one who saw it. Yet, because the test piece was required to show 55,000 lbs. tensile strength per sectional inch and broke at 44,000 lbs., a great deal of labor and costly material was deliberately destroyed, the inspector claiming that he had no discretion, which means no judgment, to exercise; and, when the case was appealed to a higher authority, that authority, who could not see this good piece of work, entirely suited for its place in the structure and with ample margin of strength, simply sent to destruction with the careless remark, written officially from the other side of the country, that the requirements of the specifications must be fulfilled.

You must not understand me to mean that physical tests are not very important in deciding the quality of material, but when applied without judgment they may result in great waste of both labor and material, for they do not present the whole case, even as to the character of the material of which the test pieces themselves are made. We often have plates of steel where the test pieces, cut directly from the plate, will give fine results, say 60,000 lbs. tensile strength and elongation of 30 per cent. in 8 in., and will double over on themselves without sign of fracture, and yet the plate itself would break like glass in bending over a large radius. I have cut test pieces right out of plates that would not bend at all, and the test pieces would double over on themselves without sign of fracture. Not long ago I had a plate of government material to bend on the press for a keel plate, but the plate broke hopelessly in bending. There was no other plate to replace it of material that had been tested and accepted for government use, and the inspector would not allow any other plate to be taken for the purpose. I, however, took a plate of steel for merchant work and bent it to the required form with no sign of fracture. We cut a test piece out of broken plate, right by the fracture, and it showed 61,000 lbs. tensile strength and 28 per cent. elongation, and bent over on itself without fracture. Then we took a test piece out of the plate that had been successfully bent to the desired form and showed 62,000 lbs. tensile strength and 22 per cent. elongation, and it broke before it had completely bent over on itself. Therefore the perfectly bent plate was not allowed to be used because the test piece did not meet requirements. Here the test intended to guard against the use of unsuited material resulted in preventing the use of eminently suitable material; not because of anything wrong in the test, but through the lack of judgment in applying the result of the test to the desired end. I could multiply cases—they are of almost everyday occurrence—where the lack of judgment in regard to the value of tests results in needless loss and in great delay in carrying out work. Lack of judgment is often manifested in a demand for unreasonably strict compliance with a specification that makes no allowance for ordinary imperfections in all products, even of the most skillful workmen. Not many days ago I had such a case to deal with in building a small marine boiler for the treasury department under a very strict specification. I found that it would make better work to weld the plate forming the sides of the combustion chamber, as the seam was in the way of the stays as shown in the drawing. The inspector thought so too, so the plate was welded; but the slight waste in heating resulted in the plate being 1-32 in. thin at the weld. I did not foresee this, but the inspector discovered that the plate was slightly thinner at the weld, and, the specification requiring a certain thickness of plate, the work was suspended until a decision should come from Washington. The decision came in due course and in the usual form, instructing the inspector to require the work according to the specifications. Now, if this had been made as specified, with a riveted joint, its strength would have been, say 67 per cent. of the plate, while the welded joint gave 92 per cent. Yet, notwithstanding all this, the work was condemned and thrown away. This loss did not result from any desire on the part of the inspector or his superior to cause loss to the contractor, but simply from a failure on their part to apply sound judgment to the question before them. A plan or specification is an instrument to be used for the production of a certain piece of engineering work. The thing produced is the only reason for the instrument being brought into existence, and when once the instrument has served its purpose its value disappears. Yet engineers engaged to apply this instrument are, as a rule (especially the young men), more intent on applying the instrument than in considering what the instrument may be doing, forgetting that the instrument can of itself produce nothing, and that if not applied with judgment it will produce only such things as the man that made the instrument could himself produce. But, when applied with the correcting power of sound judgment, acquired in the production of similar things with other instruments, it becomes pliable in the hand of a master, and the result is the combined power of the instrument with the trained judgment of him that applies it. All technical men engaged in producing tangible things out of ideas expressed in our defective language, interpreted by some one perhaps better acquainted with words than with things, and whose judgment has not been matured by any intimate knowledge of the actual work that the specification he is to enforce is intended to produce, feel how hard it is to get their position understood, and how often they must do things against their better judgment for fear it may be thought that their own interest, and not their experience, is the foundation on which their judgment rests.

RUMORED CONSOLIDATION OF SHIP YARDS.

The New York Tribune is authority for the statement that plans are again on foot to consolidate the leading ship yards of the country with the exception of the Cramps, and that $60,000,000 will be invested in the enterprise. Among the ship building firms mentioned are the Union Iron Works of San Francisco, the Wm. R. Trigg Co. of Richmond, Va., the Newport News company, the New York Ship Building Co. of Camden, N. J., the Harlan & Hollingsworth Co. of Wilmington, Del., and the Bath Iron Works. It is reported also that a meeting has been held at Richmond of the persons interested. The Tribune quotes one of the parties interested as follows:

"It is thought that the intention of the organizers is to divide the ship building work among the various concerns interested so that instead of, as at present, one yard being engaged in building war vessels of two or three different types, and also merchantmen, each plant will confine itself to one class of work. It is expected that negotiations will be concluded that will result in a friendly understanding between the new consolidation and the Cramp company."

Mr. Charles H. Cramp when approached upon the subject said: "I know nothing about the combination. These men talk as though warships were run out of a mold, like so many steel bolts. What right has one firm to tell a customer that he must go to another firm to get any part of his work done. The new combination may not work against us, but it certainly will not make any arrangements with us. The Cramps will go on doing business at the old stand."

TWIN-SCREW STEAM YACHT ALVINA.

At the works of the Harlan & Hollingsworth Co., Wilmington, Del., there was launched on Saturday last a twin-screw steam yacht that will have a prominent place in the Atlantic coast fleet of pleasure craft. The vessel is the Alvina, building for Mr. Charles Fletcher of Providence, R. I., from designs of A. S. Chesebrough. Dimensions are:

Length along rail line (top of waist), 212 ft.; length on load water line, 176 ft.; breadth, moulded, 25 ft. 11½ in.; depth from top of keel to top of deck beams at center, 16 ft. 9 in. The yacht has a clipper stem and square stern, with one continuous deck house. On the forward end of the main deck there is a forecastle deck, with crew's galley, lamp room, laundry, crew's mess, firemen's quarters, crew's lavatories, and a steam windlass. Abreast part of the deck house there is a bridge extending to the side of vessel. Above the main house is a chart house and captain's stateroom. Accommodations for crew and officers are forward on the cabin deck and for the owner forward and aft of the cabin deck. In the forward end of the house is the dining room, followed aft by pantry, owners' galley, a drying room and closet. In the after part of the house is a library and stateroom.

The vessel is to rate 100 A at Lloyds and is to be of 14 knots speed. The engines, twin screw, have cylinders of 12, 21 and 35 in. diameter by 22 in. stroke and will be supplied with steam by two Scotch boilers of 13 ft. diameter and 10 ft. 6 in. length, allowed 185 lbs. per square inch steam pressure. There are three furnaces in each boiler. Natural draft only will be used. A donkey boiler is 3 ft. 10 in. diameter and 7 ft. length. Other features of equipment are: Electric light plant for 150 lights, steam and hand steering gear; complete water tanks; evaporator and distiller; ice plant; Hyde windlass and capstan; two masts of Oregon pine; steel deck house; joinery of hardwood.

The Alvina was christened by Miss Harriet Mary Fletcher of Providence, R. I., a granddaughter of Mr. Charles Fletcher, for whom the yacht is being built.

REVIVAL OF AMERICAN SHIPPING.

WHY WE DROPPED OUT OF SHIPPING IN 1865 AND REMAINED OUT—HOW THE BILL NOW BEFORE CONGRESS PROPOSES TO BRING ABOUT A RETURN OF OVERSEA TRADE IN AMERICAN VESSELS.

U. S. Senator Marcus A. Hanna in National Magazine.

[Copyrighed by the W. W. Potter Co., Ltd.]

Few people of the present generation realize the enormous fiscal advantage accruing to a nation from the possession of a merchant marine of its own. Forty years ago this nation contested with Great Britain supremacy upon the sea. To be sure the iron ship was beginning to secure the weather gauge over the American wooden ship, but the fact was unnoticed in the general upward growth of our shipping in the foreign trade. In those days, and before railroads had gridironed the country, it was to the transportation upon the seas that our people looked with the greatest pride, and from which the nation derived its greatest single income.

All of these things have changed. With the disappearance of our ships came the advent of our railroads, transcontinental and otherwise, and our capital was busily and most profitably employed in those colossal undertakings. Had it not been for the rapid growth of our railroads, more attention would have been given to our lost shipping, after the civil war, but the growth of one to a large extent obscured the shrinkage in the other. Our people were busily employed, and they were profitably employed, and so they did not particularly concern themselves with the loss of our shipping. Capital being in great demand in our rapidly growing land industries, its owners were indifferent to the lack of opportunity for profitable investment in the ships in the foreign trade. Just the reverse was the case with our foreign rivals, especially Great Britain. There was neither opportunity nor necessity for railroad building there that there was here, and the sea continued to absorb the attention of her capitalists and her merchants. American neglect of the sea was England's opportunity. What the confederate privateers, which had been constructed in British ship yards, failed to do directly, American indifference to the sea at the close of the civil war did do.

It was entirely out of the question for our people to think of returning to the carrying of our foreign commerce, with the conditions that prevailed at the close of our great national struggle in 1865. In the first place, our ships had geen practically swept from the sea through capture and sale to foreigners. Next, our people had invested their money, to the extent that they had drawn it from their shipping, in prosperous land industries, from which latter foreign competition was almost wholly excluded. Again, it cost 33 per cent more to build, and about 60 to 70 per cent more to run a ship under the American flag than it did to build and run one under a foreign flag. Foreign ships, moreover, had every advantage in our foreign carrying, under our laws, that our own ships had free trade, with its keen competition, prevailed upon the sea, and protection with the competition confined to our infant industries prevailed upon the land. There was no chance for profit in the first, there was every chance for profit in the last. This explains completely why our people dropped out of ship owning in 1865, and why they subsequently remained out of it. If it be said that the admission at that time of foreign-built ships to American registry would have been inducement sufficient to attract American capital into our ships upon the sea, under our flag, the assertion cannot be supported. Against the difference in cost of operation of over 60 per cent, even had the ships been built abroad, they could not have been profitably sailed under the American flag. Neither in 1865 nor at any time since then, up to the present moment, has there been anything in the proposition to admit foreign-built ships to American register to attract those in the business of ship owning into such an advocacy entirely confined to free traders.

By a law which has existed upon our statutes for 108 years, foreign-built ships have been excluded from American registry. That was protection to the builders of ships in the United States to a certain extent. If an American desired to engage in our foreign trade, under the American flag, he was obliged to build the ships he required in the United States. But there was nothing to prevent him from building them abroad and running them in our trade. The fact that he would be obliged to run such ships under a foreign flag was no deterrent. In fact, in order to successfully and profitably compete he would have been obliged, even had he built his ship in the United States, to run her under a foreign flag. Why? Because the expense under foreign flags, and under which his competitors in the business were running their ships, was very much less than under the American flag. This was so in 1865, and it is so today, and has been so during all of the intervening years. So with "free ships" or without them, it would have been, as it is now, impossible to profitably run ships under the American flag in the foreign trade of the United States. Very few of the people who clamor for "free ships" are aware that the purchase of foreign ships and their operation in our foreign trade is a privilege that has never been denied to our own citizens. The mere denial of the right of American registry has not been the denial of any advantage—and this fact cannot be too often asserted in answer to the insensate clamor for "free ships."

Again, the claim that Great Britain's shipping has grown to its present proportions because of her "free ship" laws—because foreign-built ships are freely admitted to British registry—is a clear misstatement of the facts. Who will have the hardihood to assert that the British merchant marine is made up of foreign-built ships? Who will assert that more than a fraction of one per cent of Great Britain's merchant marine was built outside of Great Britain? Who will deny that British shipping is entirely British-built today? To be sure, fifty years ago a few American clippers were put under British registry, and they established a record in the British-Australian trade which was the phenomenon of the time in the regularity and celerity of their voyages—records that many Britons today pride themselves upon, little remembering that they were made by American-built clippers. But this completes, practically speaking, the entire record of British purchases of foreign-built ships. Who, in the face of these unquestioned facts, then, can honestly assert that Great Britain's marine is due to her "free ship" laws? For a free ship law to have built up British shipping, her people must have bought their ships from other nations. Unless Britons have bought foreign ships, and built up their marine in that way, their free ship laws have done nothing—absolutely nothing—to build up British shipping. If it be said, however, that foreigners have bought British ships, it cannot be claimed that the purchase of British ships by foreigners has built up British shipping—quite the contrary. To the extent that foreigners have bought British ships, to that extent competitors to British ships have been created. It cannot even be said that Great Britain's free ship laws have benefited British ship builders—because the free admission of foreign-built ships to British register did not induce foreigners to buy British-built ships.

Looked at from every point of view, the fact remains uncontrovertible, that the free ship laws of Great Britain have done practically nothing to build up British shipping. Causes entirely removed from and apart from her free ship laws are responsible for the growth of British shipping. To the extent, therefore, that an attempt is made to delude Americans into believing that the growth of British shipping is due to her navigation laws, to that extent a palpable untruth is being circulated. It is equally true that the free admission of foreign-built ships to American register would have no appreciable effect upon the growth of shipping under our flag in our foreign trade. Once this fact becomes known, once it dawns upon the minds of sincere American advocates of free ships, the fallacy of their argument must be apparent to them. It is to be expected that the iteration and reiteration of this truth all over the country will do much to eliminate from the discussion of the shipping question an alternative proposition that, if adopted, would accomplish practically nothing for our shipping in the foreign trade.

Coming down to the shipping bill now pending in congress, there is much to be said. It recognizes that there still exists a difference in the cost of American as compared with foreign-built ships equal to about 25 per cent. In order to induce our people to build ships in this country, they must in some way be indemnified against the disadvantage of this 25 per cent extra cost of construction. The reason why it is desirable to have ships built in this country is that it equips the nation with ship yards, which are, in a way, and a direct way too, a part of the naval equipment of the United States. The more demand we create by favorable legislation for American-built ships, the more plants we bring into existence to compete for the building of our warships, and, inevitably, the cheaper will be the cost of our warships to the nation. Then again, the employment of American labor, in the putting together of American materials, into ships in American ship yards, will cause an expenditure in our ship yards alone of from $50,000,000 a year upwards, where less than a million is now being expended; that is to say, for ships to engage in our foreign carrying trade. It has been computed that this accomplishment would, in the employment that would be given through the expenditure of that money over and over again in the United States, maintain at least 1,000,000 of our people, by giving employment to at least 250,000 more than employment is given to now. Again, it will attract American boys into our ships, a thousand of which will be in demand the moment the bill becomes a law, and additional thousands of which will be educated at the expense of our ship owners during the entire life of the bill.

The bill now before congress for the rehabilitation of our shipping in the foreign trade, therefore recognizes that the requirement that the ships shall be built in the United States, involves the owner in an extra expense of about 25 per cent, as compared with his foreign rival possessing a foreign-built ship. While it is expected that the demand for American ships will eventually reduce the cost to the level of foreign-built ships, and without reducing the price of American labor, that accomplishment will not be immediate, and the bill merely provides compensation to offset that extra cost during the period that the cost in this country will be higher than abroad. Interest, depreciation and insurance must be carried along on that extra cost, as well as on the entire ship, during the period of her life; and that explains why the bill provides for the payment of this compensation for twenty years. Then again, the cost of running ships under the American flag has been computed at between 30 and 40 per cent higher than the cost of running foreign ships. Provision is made in the bill to offset that extra cost too, by the payment of the compensation provided for in the bill. Whether the ships sailing under our flag and register be American of British-built, this difference in cost of operation will exist. It is due to the higher wages paid to American officers, seamen and firemen, and to the better quality and larger quantity of food furnished them. Unless these better wages are paid, and unless this better food is provided, we cannot secure Americans, either as officers or as seamen and firemen, to run our ships in the foreign trade. The offsetting of this difference, in order to make good to the American owner the extra cost of operation, is an essential prerequisite to our maritime growth under our flag.

The value of the ships that are built in the United States, and the value of the men who man them, to our navy, in time of trouble, in itself will more than compensate the United States government—the American people—for all the money they expend in inducing our citizens to build and to run ships under the provisions of this bill. Then again, the bill provides extra compensation based upon larger size and greater speed. This extra compensation is provided in order to offset the subsidies and bounties paid by foreign governments to foreign ships, that will be in competition with American ships in our foreign trade. It is true that the ships of the greatest speed are most useful to the nation in time of trouble, as was amply proven during the Spanish war, when the four fleet ships of the American line on the picket line of the Atlantic searched for the dreaded Cervera fleet, and after locating it swiftly bore the news to the American squadrons waiting to engage them. It was the knowledge that the Spanish government had of the impressment of these swift American steamships, that prevented Spain from sending Cervera to any of our Atlantic seaports, but that compelled our enemy at that time to send his ships far to the south.

The value of the four fast ships of the American line, during the short-lived war with Spain, cannot be computed in dollars and cents. The value of the ships themselves was as nothing to the security their presence upon the picket line gave to the business interests of the nation during that period of dread suspense. To have similar ships to these built hereafter, the bill must make such provision as will safeguard owners against loss in their operation. This is not a question of benefiting this or that ship owner, or this or that corporation—it is a question, merely, of benefiting the United States as a nation. The benefit to the individual or the corporation that builts the ship and runs it, is a mere incident—a very necessary incident—but an incident, nevertheless, to the accomplishment of that which makes for the better safety of the United States in the place where, of all places, it is most weak. Let us strike from the bill the pro-

vision that insures to the nation the construction of swift ships, always at the command of our government, and we deprive the nation of one of the most essential and potent weapons of auxiliary national defense.

Aside from the provision encouraging the vessels engaging in our fisheries, and the American citizens who man them, to continue in and expand in their hazardous deep sea employment, the chief provisions of the bill have been here presented, stripped of the bothersome feature of statistical detail. It should be said that the bill provides compensation at the rates fixed in the bill for a period of not to exceed twenty years, and that at no time shall the sum thus expended exceed in any one year $9,000,000. As soon as enough vessels come into existence to absorb all of this sum, in any one year, each additional ship thereafter built draws from the others in existence a pro rata share in the compensation sufficient to give the latter, size and speed being equal, the same compensation that the others receive. By this provision there is no limit to the number of vessels that may enjoy the compensation, but there is a limit to the sum that will be paid to them. As our marine grows, it is expected that cost of operation will be reduced, so that the amount of compensation may be reduced pro rata, as the bill provides, without checking the growth of our marine or the safe reliance of their owners upon the government compensation.

It should have been said that an important provision of the bill is that which admits to American registry such ships as were on Feb. 1, 1889, either built or under process of construction for American citizens abroad. Such ships, when admitted, are to receive compensation equal to one-half that paid to American ships, but their owners are required to first have built in the United States tonnage equal to that admitted. The purpose of this provision was to prevent, through the operation of the bill, the infliction of any injury upon such American citizens as have in good faith been compelled to purchase foreign-built ships and run them in our foreign trade. But, by compelling them to build tonnage equal to 100 per cent of that admitted to American registry, and paying to the foreign ships only one-half of the compensation paid to American ships, exact justice has been done. This provision it is expected will cause these present American owners of foreign-built ships to hereafter have all the ships they need for their foreign trade built in the United States. As to this provision, there has much that is untrue been said. The reason that only such vessels as were built or building on Feb. 1, 1899, are to be admitted to American register is because it is the purpose of the bill to encourage only the construction of American-built ships for the carrying of our foreign commerce. To provide for the subsequent purchase of an unlimited amount of foreign tonnage would defeat the chief purpose of the bill. It is not intended to encourage Americans to buy foreign-built ships —it is intended to encourage them to buy only American-built ships. It is also intended to discourage the further purchase of even one foreign-built ship for the carriage of foreign commerce of the United States. There is no trick or job in this provision—it is in consonance with the wishes of the American people, to wit, that the country should aid in the building up of an American—not a foreign—merchant marine.

The whole question resolves itself into this: If the American people can be brought to understand the need and value of an American mercantile marine to the nation, then the bill now pending makes provision for just such an accomplishment. It also provides for its accomplishment by what is considered by those who have studied the question for years the only plan that will practically and quickly establish American ships upon the high seas. The benefit aimed at is for the nation. To secure that benefit for the nation, incidentally certain individuals—those willing to risk their capital in American-built ships in our foreign trade—will be safeguarded against loss and competition with foreign ships in our foreign carrying. This result, it cannot be said too emphatically, will entirely fail of accomplishment, unless there is a very substantial reduction in the rates of freight charged for the carriage of our imports and exports, as only by reducing rates can American ships expect to wrest any of the carrying from their foreign competitors. This reduction in rates, it is believed, will several times over repay the American people for whatever expenditure the government may make directly to the people who benefit by the provisions of the bill. The American people will receive the benefit of an American merchant marine, subject at all times to the necessities of the government, for the money they expend. Those who invest their capital in American ships will be compensated for the disadvantages that American conditions impose upon them in competition with foreign-built ships. There can be no monopoly of any route by any line or class of ships. Every route is open to any American ship that chooses to enter it. Any American may build that type of ship that he believes will be most advantageous to him under the terms of the bill. The pending shipping bill is an equitable, honest, scientifically drawn, automatically adjustable measure, destined to place the American flag once more upon the sea to the material benefit of all of the American people. The effect of such an accomplishment, in perfecting the defences of the nation, will be worth, each year, the entire cost of the operation of the measure during its entire life.

THE SHIP SUBSIDY BILL.

There are some questions of great national importance which, because of their complexity and the many side issues which attach to them, are peculiarly liable both to misunderstanding and misrepresentation. To this class belongs the ship subsidy bill, a measure which has been defined and explained by its friends with a clearness of definition, and an honesty of purpose, that are only equaled by the misrepresentation (much of which we are willing to believe is quite unintentional) with which it has been clouded by its enemies. The confusion of ideas regarding the present state of our shipping interests is due largely to the fact that, in much of the written and spoken discussion of the subject, there has been no distinction made between those shipping interests which are protected and those which are not. To avoid such confusion we will ask our readers to omit from the present consideration that portion of our shipping which is included under the term "lake and coastwise," and to bear in mind, also, that in excluding this we exclude by far the largest portion of the tonnage that carries the flag of the United States. Our lake and coastwise shipping must be omitted for the reason that it is secured against foreign competition by a sweeping law which forbids any foreign ships from engaging in this particular trade; the fostering effect of which law is seen in the fact that our lake and coastwise traffic is both healthy and highly remunerative, and is increasing by leaps and bounds. When we come to consider our merchant marine, however, we find that it is exposed to the direct competition of maritime nations, who are able to build and operate their ships at a cost so much lower than ourselves, that any hope of successful competition is out of the question. The ship subsidy bill has been drafted with the idea of affording such assistance to the merchant marine as shall place it on equal terms of competition with the rest of the world.

It is a matter of fact, as we shall show, that under existing conditions the United States cannot compete successfully with other nations either in the first cost, the cost of maintenance, or the cost of operation, of ocean-going steamers. It is a matter of opinion, whether, as a question of broad, far-seeing policy, the treasury of the United States should render to the ship owners such temporary financial assistance, in the early years of a serious and determined effort to move up to our proper position among the maritime nations of the world, as will place us on equal terms, and give us a reasonable hope of being ultimately able to maintain and improve our position without such national aid. It is a matter of fact that although the cost of the crude material for ship building is not materially greater in this country than abroad the cost of labor is so considerably greater that there is an ultimate difference in cost per ton of the ship at the date of her launching in favor of the foreign builder of at least 20 per cent. It is a fact that whereas the Pleiades, a 3,750-ton cargo steamer, of 9¾ knots speed, which has the distinction of being considerably the cheapest cargo steamer ever built in this country, cost $275,000, the British steamer Masconomo, of 4,200 tons, and 10 knots speed, cost only $217,000. It is a fact, moreover, that while the annual charges on the Pleiades, based on the cost of construction, amount to $44,000, the annual charges on the Masconomo amount to only $34,240. It is a matter of fact that while the total annual wages paid to the crew of the Pleiades amounts to $14,580, the total annual wages paid out on the Masconomo amounts to only $11,751, while the total wages paid out in one year to the British ship Pinedene, of about the same size and type as the others named, amounts to only $9,505. It is a matter of fact that a mass of statistics, gathered and digested by the commissioner of navigation for the United States, shows that in the cost of construction of cargo steamers there is an average difference in favor of Great Britain of 20 per cent., and in cost of operation of 33 1-3 per cent. It is a matter of fact that the possibility of carrying on a profitable competition under such unequal conditions has discouraged the investment of capital in our merchant marine, and has diverted it into the more promising channel offered by our protected and flourishing lake and coastwise trade. It is a matter of fact that owing to the stagnation of our merchant marine we are now paying out annually, at a conservative estimate, $240,000,000 to foreign ship owners for carrying our rapidly increasing exports across the seas.

In the presence of these facts we are confronted by the question as to whether it is consistent with the commercial interests of the nation, to say nothing of its proud traditions, that we should be beholden to a foreign flag for the transport to foreign markets of the multiplied products of our fields and factories. The ship subsidy bill has been drawn up under the conviction that, contemporaneously with the present enormous increase in our manufactured exports, there should be a determined national effort to resuscitate our merchant marine, and place ourselves in a position where we can act as the carriers of our own products and thus secure the rich returns upon our industries, in their entirety, where now so much of it is diverted elsewhere. On the other hand, the opponents of the bill profess to be perfectly satisfied with the existing situation, and quite willing to allow the foreigner, as long as he can carry our goods more cheaply than ourselves, to do so.

Without making any obvious comment upon the unprogressive spirit which lies behind such an attitude, we offer the following considerations: First, that such an attitude means the practical abandonment of any considerable development of deep sea shipping in America. Secondly, that this involves that the United States must be destitute of any numerous or adequate auxiliary merchant marine. Just what this implies may be best understood by reference to the deplorable muddle into which our transportation was thrown, when we put our little army into Cuba, and endeavored at the close of the war to bring the disease smitten victims home again. A numerous auxiliary merchant marine is an indispensable accessory to distant foreign possessions; and it is a fact that, although we disdain to designate our little affair in the Philippines by the name of "war," it has lately been necessary for our quartermaster department to charter, in addition to our considerable fleet of transports, no less than forty vessels to carry supplies to the Philippines alone. Lastly, we invite consideration of the fact that if Great Britain, which acts so largely as our carrier on the high seas, were to be at war with us, a contingency which, though unlikely and greatly to be deprecated, is yet a possibility that must never be lost sight of, we should be utterly unable to get our vast and rapidly increasing exports out of the country. Germany could carry but a part of it, and her commercial instincts are not so altruistic but that she would make haste, by an enormous increase in rates, to reap a rich harvest. The loss from this source alone would amount to more than the annual amount of subsidy asked by the present bill for many years to come.

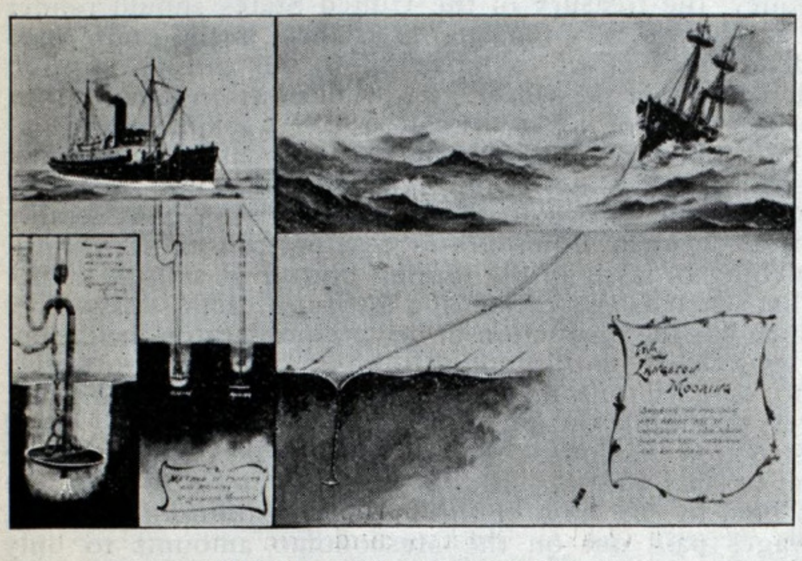
The question before us then may be stated succinctly as follows: Is it desirable that the nation as a whole should transfer from the national treasury to the individual ship owners the money equivalent ($9,000,000 a year) of the actual disadvantages under which our ship owners labor as compared with the ship owners of a competing nation? After a careful review of the whole situation, it appears to us that such a policy, if carefully followed out for a period of years, would so far stimulate ocean-going ship building, that the decreased cost of production due to increased output, the decreased fixed charges, and the decreased cost of operation due to improved ships and better methods, would enable us sooner or later, and rather sooner than later, to dispense with the subsidy and take our place as one of the great maritime nations of the world.—Scientific American.

The torpedo boat Bailey, which last month had hard work in trying to reach a speed of 30 knots and finally had to abandon the trials on account of the improper coal supply, was sent over the measured mile in Narragansett bay a few days ago with the same object in view. The trial was perfectly satisfactory and the best speed was 30.8 knots.

LANGSTON MOORING DEVICE.

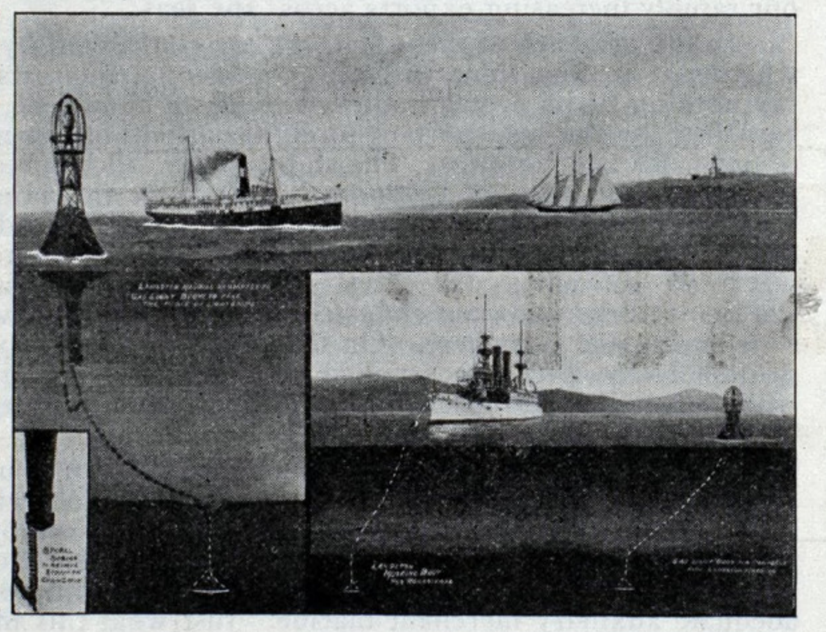
Vessel men who attended the annual meeting of the Lake Carriers' Association in Detroit last week witnessed the operation of the Langston mooring device on a small scale. A model of the device was used to sink one of the disks in a large can of sand. The operation proved very interesting and the device was a source of great wonder to everybody who examined it. Mr. J. M. Cutheil of No. 18 Wall street, New York, who controls the patents, was in attendance and was accompanied by Mr. Langston, the inventor, who conducted the experiments.

This device was briefly described in these columns several weeks ago, but the illustrations used herewith, which have since been secured, will tend to more clearly show its workings. It is especially adapted to buoys, and, as shown in one of the illustrations, might be used to great advantage in connection with the large gas buoys that are now so generally used as aids to navigation by the United States light-house service. A bill was recently introduced in the house of representatives by Congressman Cummings, providing that the secretary of the navy be authorized to purchase for vessels of war a large number of these anchors, and it is also proposed to secure from congress, if possible, an appropriation to be used to the same end by the light-house board and the revenue cutter service of the treasury department. It is not claimed that the device when used aboard vessels can be made effective in a hurry as is the case with an anchor, but it would be invaluable in various ways in event of a vessel going ashore.



Mooring device in operation.

The device consists of a cast iron disk of any desired diameter from 10 in. up to 2 ft., on the concave surface of which strong lugs are forged for the holding of triple rings, to to which a chain may be attached by a shackle. To sink the device, the nozzle of a 1½ in. galvanized pipe is passed through a hole which is bored through the center of the disk. At the upper end of the pipe a hose is attached by means of an inverted U connection (this form being used to prevent cramping), and by this means a stream of water is forced to the under surface of the disk by means of a hydraulic pump. Any ordinary pump aboard ship may be used for the purpose. The chain is stopped to the pipe to keep the disk firmly on the nozzle, and the whole apparatus, pipe, hose, chain and disk, is supported from a davit or gaff and, therefore, easily maintained in a vertical position. The disk is lowered to the bottom until it rests upon the sand or other material in which it is to be sunk, when the pump is started. The stream of water, passing through the disk to its under or convex side, loosens the sand and allows the disk with its pipe, chain, etc., to sink into the vertical hole, which is thus continually being washed out as the apparatus descends. The apparatus being supported from a davit in the way described, it is practicable to lower the pipe to the bottom in any depth of water where anchorage may be desired, the pipe merely being long enough to steady the disk in the hole which is bored in the sand or mud of the bottom, and put a disk down from 10 to 30 ft. or more below the bottom. When the disk is at the proper depth, the stoppings of the chain are cast off, by releasing a clutch, and the pipe is withdrawn. The disturbed material immediately settles back on the disk and around the chain, burying it firmly in place. It can be readily seen that the holding power of this form of anchorage is enormously greater than that which can be obtained by means of the plow point of an ordinary fluke anchor or the broad lip of a mushroom anchor, whose hold upon the sand or mud is merely superficial.



Mooring device applied to gas buoys.

Trials of the device have been made by officers of the navy and the light-house board. One experiment near New York some time ago was carried out with a 12-in. cast iron disk, which was put down through water 18 ft. deep, to a depth of 8 ft., in a bottom of sand and clay. The time required from the starting of the force pump until the sinking was complete was 6½ minutes. A ⅝-in. crown chain, 15 fathoms in length, was attached to the disk. The accompanying illustrations show very clearly the action of the water in cutting away the sand and clay below the disk and excavating the vertical shaft at the bottom of which the disk was deposited. The sand, etc., closes in somewhat upon the chain and pipe as the disk descends, but upon the withdrawal of the pipe the discharge of the water loosens the surrounding material sufficiently to allow of the easy withdrawal of the pipe, after which the material closes in quickly and solidly above the disk and around the connecting chain, as shown in the illustration.

Sixty minutes were allowed for the filling in of the hole, which, while it was probably not sufficient for the completion of the process and the thorough settlement of the loosened material, sufficed, as the test afterward showed, for all practical purposes. A new 7-in. hawser was attached to the chain, and 25 fathoms were paid out and made fast to the towing bits of the ocean-going tug DeWitt C. Ivins, the newest and most powerful vessel of the Moran towing fleet. The tug has a compound engine with cylinders of 15 and 30 in. diameter by 22 in. stroke, and the boiler carries 140 lbs. of steam pressure. The propeller, which is 8 ft. 6 in. in diameter, was turned at 105 revolutions, and this was subsequently increased to 120, a rate which was maintained up to the conclusion of the test, or for a period of twenty-one minutes. The tug failed to produce the slightest effect upon the stability of the buried disk, and it was the unanimous opinion of the officials who witnessed it that the demonstration was completely successful. Although the holding power of the device is so great, the removal of one of these disks is a very simple matter. The hose is brought into requisition, and a double ring, shaped like the figure 8, is fitted tightly to the lower end of the hose and loosely on the mooring chain, down which it slips. As the pipe descends, the stream of water speedily cuts its way through the sand, opening a way for the pipe, until, guided by the chain, it reaches the disk, which may then be drawn up without difficulty.

AMERICAN SHIP BUILDING CO. FIFTH IN TONNAGE.

From Syren and Shipping, London

Again the ship building year has been a good one, although the industry has had many ills to contend with. Perhaps the chief of these has been the matter of lost time. Men have been making good money; and, to quote a biblical expression, have waxed fat and kicked. Unfortunately, though, the kicking was not of the character which removed the bed clothes in the morning. The complaint is by no means a new one; but, perhaps, the disease has been more accentuated in 1900 than in any previous year for a very long time past. To some extent, patriotism, so called, has been responsible for much of the lost time. As beleagured garrisons were relieved in South Africa the men knocked off and made a day of it. This might be excused, for Jack was only doing as his master did; but. whereas the latter turned up smiling, albeit with a "head," the next morning, Jack did not; to him the evening and the morning were the first day, and on to it he tacked one or two more. The evil of this broken time is far reaching and difficult to combat. The society has done what it could, we are told, but with no effect. Employers have complained, ship owners have had to make the best they could of delayed ships in time of booming freights; but the workmen have triumphed. Labor has again asserted its might, and the country generally has suffered. The problem here presented is a great one, and will have to be solved one day. It appears to us that, beyond the complaints above referred to, no proper steps have been taken by the representatives of capital. Closely allied with the question of labor is that of machinery. The ship building industry of this country is promised severe competition from the United States, the home of perfected plant. Our ship builders know and recognize this fact. Have they taken such steps as are necessary to deal with the matter, or does the new century open with Britain as far back as ever in this connection? Although there are exceptions, on the whole, we fear that our great ship builders remain blind to one of the greatest dangers that has ever threatened their industry.

During the year the trade has also had to suffer from the high cost of material. Coal, steel and iron have all advanced at huge rates, with the result that the price of new tonnage has had to be put up. This has not, however, been an entire evil, in that the enhanced price builders have been compelled to ask for new ships has kept buyers off, so that the danger of a glut of tonnage has been to some extent removed. Price of raw material is now, however, on the down grade, and orders for new tonnage may be expected. The high price ruling for steel plates has afforded an opening for American competition, and from the mills of the United States ship plates have been sent here at a lower price delivered than that at which British firms could deliver. Whether this competition will continue or not is doubtful. It has to be remembered that, thanks to protective tariffs, the American can sell foreign at a dead loss on the surface, but he recoups this by the price he charges his home consumer. This fact is one to bear in mind when considering the effect of the United States shipping subsidy bill should it become law. At what price will the American manufacturer supply his own country's ship builders with plates, and will the bounty be enough to satisfy his demands? Is it not possible that the American cousin generally may want to " make a bit," with the result that the goose that lays the golden eggs may be slaughtered? Time will show, but generally speaking, the extent to which the United States will enter into ship building competition with us is one of the most interesting problems the opening years of the new century will have to solve for us. Indeed, the whole question of the United States as a ship building country is of interest. The American builder on the coast does comparatively little, but see what he turns out on the great lakes. Take the American Ship Building Co. of Cleveland. Their output in different lake yards during 1900 was no less than 57,840 tons, a figure that justifies a fifth place in the world's output of tonnage. When taking into consideration foreign competition in ship building, one is compelled to regard Germany. There 1900 has presented us with the spectacle of the Deutschland, the world's fastest passenger steamer, launched by the Vulcan company of Stettin. That yard put into the water, during last year, 40,262 tons, represented by three steamships, averaging over 13,420 tons. Of the cost of these vessels we are unable to speak with any authority; their quality, however, is known to the world, and the matter is of importance to us as representing a very present source of competition in an industry which we have all considered as an exclusively British possession. Then, again, in considering ship building, and its outlook, it is of prime importance that France must be taken into account. An improved shipping bounty bill is about being passed, the effect of which will be to give an enormous impetus to the construction of steamers by our Gallic neighbors. Undoubtedly our supremacy seems to be threatened, but, after all, many years will have to pass before the position may be regarded as one of jeopardy.

ANNUAL REPORT LIGHT-HOUSE BOARD.

The annual report of the United States light-house board is one of the most comprehensive that has been issued by that body. The board has recommended in the proper places in the report that appropriations be made for building a light-vessel for Cape Lookout Shoals, N. C.; a relief light-vessel to be used for both districts on the Pacific coast; a small, inexpensive light-vessel for Peshtigo reef, Green Bay, Lake Michigan; a steel steam light-vessel for Martins reef, Lake Huron, and a steam light-vessel, with all modern improvements, for use at Blunt's reef, off Cape Mendocino on the Pacific coast. The board recommends that appropriations be made for building six new tenders and that further appropriations be made for four tenders, for which partial appropriations have already been made. The recommendation which has been made in the last three annual reports that a steam tender be built for the use of the inspector of the tenth light-house district (Lakes Ontario and Erie) is renewed. The appropriation for a tender for the inspector of the ninth light-house district (Lake Michigan) has been found insufficient to complete the vessel, owing to the increase in the cost of labor and material in metal ship building, and an additional appropriation is urgently recommended. The board also recommends the construction of a steam tender for use in St. Mary's river, Michigan. In consequence of the increased commerce passing through this river and the great necessity for keeping its aids to navigation in the best possible condition an iron steamer drawing not more than 6 ft. of water and a specially strengthened bow for crushing ice is required. Special appropriations for the lake district are as follows:

NINTH DISTRICT—LAKE MICHIGAN.

Milwaukee breakwater and harbor of refuge, light and fog signal	$75,000
Fisherman's shoal light and fog signal station	75,000
Pointe aux Barques light and fog signal station	32,000
Portage Lake light station, keeper's dwelling	3,500
Kewaunee light and fog signal station, keeper's double dwelling	7,500
Calumet pierhead light station, keeper's dwelling	Authority
Holland pierhead range, fog signal	6,000
St. Martin island light and fog signal station, additional	14,000
Little Gull island light and fog signal station	20,000
Peshtigo reef light vessel, Green bay	15,000
Tender for the inspector ninth light-house district, completing	30,000
Tender for the engineer ninth light-house district, increasing the limit of cost	Authority
Depot for the ninth light-house district	50,000

TENTH DISTRICT—LAKES ERIE AND ONTARIO.

Chapman shoal light and fog signal station, St. Lawrence river	25,000
Oak Point, St. Lawrence river, range lights and keeper's dwelling	10,000
Tibbetts point, St. Lawrence river, keeper's dwelling	3,500
Fort Niagara, small light at mouth of river	2,000
Toledo harbor light and fog signal station, completing	62,500
Port Clinton light station, keeper's dwelling	3,000
Grassy Island range (Ecorse) light station, keeper's dwelling	5,000
Grosse Isle south channel range light station, keeper's dwelling	5,000
Grosse Isle north channel range light station, keeper's dwelling	3,500
Tender for the tenth light-house district	120,000

ELEVENTH DISTRICT—RIVERS, LAKE HURON AND LAKE SUPERIOR.

Middle island light and fog signal station	25,000
Crisps point light and fog signal station	18,000
Rock of Ages light and fog signal station	125,000
Eagle river light station, moving to Sand hills	25,000
Isle aux Peches range, additional lights	12,000
Tawas light station, keeper's dwelling	5,000
Martins reef light vessel, Lake Huron	35,000
Tender for St. Marys river	60,000

Regarding vessels for the lake districts the report says: "By the act approved March 3, 1899, an appropriation of $85,000 was made for constructing, equipping and outfitting complete for service a new steam tender for the ninth light-house district, Lake Michigan. Plans and specifications were prepared and bids asked, to be opened June 25, 1900, but not one bid was received. It is understood that the reason for this is that the amount appropriated is insufficient to pay for the work needed. The estimates made for the cost of this vessel two years ago would have been sufficient to build her then, but the great advance in the cost of labor and the material needed in metal ship building is such that she cannot be built now for less than a third more than she would have cost then. It is estimated that it will cost at least $15,000 more to build this vessel. The board therefore recommends that an appropriation of $30,000 be made in addition to the $85,000 already provided."

The board recommends that $120,000 be appropriated for a tender for the tenth light-house district (Lakes Ontario and Erie) to replace the Haze, which is twenty-four years old and has no longer suitable quarters to provide for such a fast growing district. The sum of $60,000 is also asked for the tender for St. Mary's river.

The steamship Norfolk, which has been undergoing a thorough overhaul at the yard of the Maryland Steel Co., completed repairs last Monday. She belongs to the Washington & Norfolk line of passenger boats. Her two boilers of 13 ft. length and 13 ft. diameter have been replaced with four boilers of 12 ft. length and 11 ft. diameter, with a heating surface of 1,424 sq. ft. in each boiler. The engines have been put in first-class shape, while the staterooms and cabins and the whole ship has been brought up to prime condition. The Washington of the same line is expected shortly at the Maryland company's works, to be renewed in the same manner.

The Nickel Plate road will send its 1901 Pan-American exposition calendar to anyone sending their address to the general passenger agent at Cleveland, O. 2, Jan. 31.

"LITTLE GIANT" Pneumatic Tools

Recognized by the Mechanics of the World to be the Most Efficient and Practical AIR Tools Manufactured.

New "Little Giant" Long Stroke Hammer.

"The Best Yet." Will Drive Perfectly One Inch Rivets. No Vibration. Guaranteed Against Repair for One Year. Our Hammers are unexcelled for all classes of Riveting, Chipping, Calking, Beading, Etc. MADE IN ALL SIZES.

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Send for our latest Catalog "E." It will interest you.
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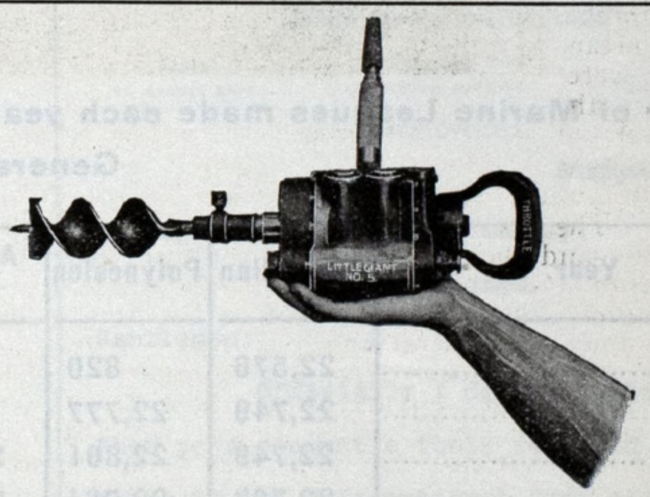

The "Little Giant" Reversibie Boring Machine No. 5

Especially Designed for Shipyard and Dock Work. Will Bore up to 4" in Diameter in any kind of wood. Piston type. Weight, 14 lbs. Very Powerful. Will perform the work of five men. In use in all the U. S. Navy Yards and Large Shipyards.

STANDARD PNEUMATIC TOOL COMPANY,

MANUFACTURERS OF PNEUMATIC TOOLS AND APPLIANCES OF EVERY DESCRIPTION.

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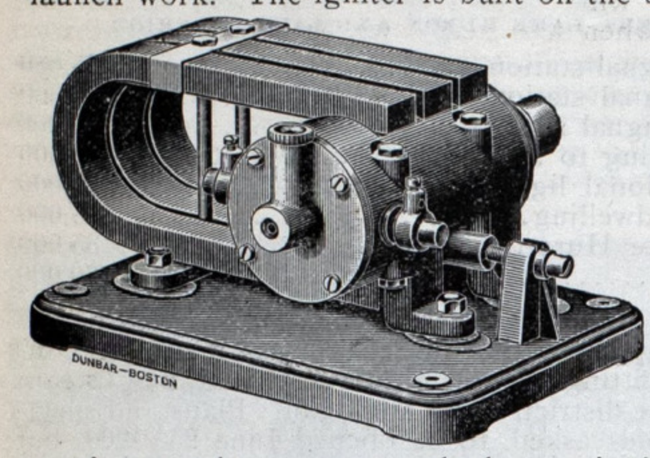
NEW PATTERN H. C. IGNITER.

There is illustrated herewith a new type of the well-known H. C. magneto igniter, which has been put on the market to meet the demands for a smaller size machine to be used in connection with automobile or launch work. The igniter is built on the same lines as the standard machine and has the same characteristics which have made the latter so popular with gas engine users. The permanent magnetic field insures the instant generation of the current while no energy is wasted to magnetize same. The armature can be rotated in either direction with equal satisfaction, and it can be run under a very wide range of speed.



This machine also has long bearings equipped with grease cups, so that although the output is not quite so great as the larger sized igniter its lasting qualities are fully equal to it. Recent improvements have been made in the brush holders and a new type of brush adopted, so that a perfect contact with the commutator and ample conducting surface is at all times secured. A comparatively large square carbon brush is used and an especially designed holder, allowing a great range of feed and giving constant tension. Dimensions of the igniter are as follows when mounted in a horizontal position: Height, 4⅝ in.; length, 9 in.; width, 7 in.; weight, 14 lbs. This is mounted on an adjustable iron base 8¼x6 in.

Machines when mounted as shown in the cut are well adapted for placing in confined localities; they can be run either by friction pulley or belt, which ever may be more convenient. The working parts are all enclosed and are dust and moisture proof. The Holtzer-Cabot Electric Co. of Brookline, Mass., have just issued a new booklet, giving full description of their igniters, which they would be pleased to send to interested parties.

BENEDICT-NICKEL SEAMLESS TUBING.

The Benedict & Burnham Mnfg. Co. of Waterbury, Conn., are large manufacturers of brass, copper and bronze seamless drawn tubing and have been for more than a quarter of a century, but as a demand existed for a seamless tubing superior in quality to any of these they lately took up a series of experiments looking towards its production, and the result is Benedict-Nickel seamless tubing, a product particularly adapted to condenser tubes. The first vessel of war in which it was used for condenser purposes was the Newark of the United States navy. In a very neat pamphlet dealing with its properties and uses a photograph of tubes taken from the condenser of the American line steamer St. Paul after twenty-eight months' service, is reproduced. The picture shows the tubes in perfect condition. There is no evidence whatever of disintegration. This tubing is produced by a patented hot rolling process, of which the Benedict & Burnham company is the sole licensee in the United States. By this process a single operation transforms a solid cylindrical billet of the heated metal into a tube, the action of the rolls increasing the firm and solid texture of the metal, and producing an exceedingly tough and strong tube.

"The uses for brass, copper and bronze seamless tubing are infinite in number," the manufacturers say, "and they will always be used in large quantities, but for special purposes where a superior article is required, something elegant in appearance, possessing highly non-corrosive qualities, tough, malleable, of high tensile strength, in fact, a metal superior in every way, we offer Benedict-Nickel seamless tubing as answering all of these requirements. In regard to the first cost of brass, copper, or Benedict-Nickel tubes, brass is the cheapest, but if condenser tubes of Benedict-Nickel cost twice as much as brass, and wear twice as long, they will still be the cheapest, because the labor expense of one renewal is eliminated. But the comparative life of Benedict-Nickel is much longer than twice that of brass, so that economy is a strong argument for its use."

SEAMLESS STEEL TUBES CO. OF DETROIT.

The Seamless Steel Tubes Co. of Detroit, in which Senator McMillan of Michigan is a large stockholder, announced with the opening of the year the completion of its large factory. Wm. Thornburg is vice president and general manager of the company, and Mr. W. C. McMillan secretary and treasurer. The works are at 833 River street and the general offices in the Union Trust building. Referring to the factory the company's first announcement says:

"In its conception, construction and equipment, the endeavor has been to meet in the fullest sense the requirements necessary to the production of seamless steel tubes of the highest grade for steam engineering and other purposes. These facilities cover a range of sizes from 1 in. to 3½ in. outside diameter. The material used in the production of these tubes will be of the very best grade of open hearth steel, manufactured especially for this purpose. This with first-class, thoroughly modern machinery, handled by workmen long experienced in the manufacture of seamless steel tubes, is an evidence of what the finished product will be."

A partial list of applications for seamless steel tubes, contained in the company's announcement, is as follows: Tubes for locomotive, marine and all other classes of steam boilers; hollow shafting, hollow axles, oil well working barrels, hose poles, hollow spindles, roller bearings, ball bearings, pneumatic hoists, rock diamond drills, pneumatic and steam, gas and steam engine cylinders, gun barrels and ordnance, bushings, hydraulic tubes, compressed air cylinders, spinning caps, trolley poles, bearing cups, pump cylinders, locomotive bushings, collars, rings, traction engine bushings, collars, rings, conveyors, motor carriages and vehicles, armature journals, pinion bushings, gas bottles, flanged couplings for steam pipe and compressed air, upset tubes.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890	22,576	820									
1891	22,749	22,777	68								
1892	22,749	22,801	23,274	7,753							
1893	22,793	22,781	22,762	22,749							
1894	22,813	22,789	22,858	22,813	12,567						
1895	22,891	22,922	22,913	22,936	13,629	9,571					
1896	23,178	30,906	23,232	23,183	20,735	21.051	13,572				
1897	22,750	23,202	30,912	23,185	20,745	25,370	21 119	14,382			
1898	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

TRADE NOTES.

The Standard Automatic Releasing Hook Co., Chesebrough building, New York, have issued a very tasty calendar devoted to their celebrated hooks for the safe launch of life boats. It is embellished with a picture of a launch of a life boat, now very well known to the trade.

The Schultz Bridge & Iron Co. has been awarded the contract for a pier and warehouse at Progresso, Yucatan, Mexico, for the Compania del ferro carrill Muelle y Almacences del Commercio. The pier is to be constructed for a double track railroad and will be 40 ft. wide and 550 ft. long; 8-in. solid steel piles will be used.

"Draft Without a Chimney" is the title of an interesting little booklet of which the fourth edition has just been issued by the B. F. Sturtevant Co., Boston, Mass. This brings the total number of copies printed up to 50,000. It relates to the experience of the Sturtevant Co. in the use of a fan to produce draft without a chimney in its own works. Copies will be furnished on application.

The Continental Iron Works, New York, has issued a book, excellently bound in cloth, body of red and embellished in gilt, devoted to the Morison suspension furnaces for marine boilers. Rarely has so beautifully prepared a volume been offered to the trade. The book contains a complete history of the development of the furnace of which they are the sole makers in the United States.

The Olds Motor Works of Detroit, Mich., manufacturers of a gasoline marine engine of the four-cycle type, are reaping the benefits of the reputation which they established in past seasons for a speedy and reliable motor, as even at this early date they are booking orders for the coming season, to say nothing of a very large number of inquiries from parties who contemplate purchasing during the coming season.

The Bethlehem Steel Co. has been informed that a concern styling itself the Edison-Holzer Steel & Iron Process Co. has been using the name of the Bethlehem company in a letter issued by them, in which they ask for subscriptions to the stock of their company. "We beg to state," says one of the officers of the Bethlehem company, "that our company has no connection whatever with the Edison-Holzer Steel & Iron Process Co., nor do we in any way endorse the merits claimed by them for their process for treating steel."

A note from the Cleveland Punch & Shear Works Co. is to the effect that a new battery of boilers was placed in operation at their works on the 17th inst. and that they will soon have a new engine installed and running. With modern electrical equipment throughout their shops, they expect to have one of the most complete plants in the country for the production of heavy tools. They recently received an order from the government for one of their heavy punches for the Mare Island navy yard; an order for a 72-in. multiple punch for the Ohio Cultivator Co., Bellevue, O., and for eight punches for American Car & Foundry Co., Detroit.

The Buffalo Forge Co. has recently placed upon the market an extremely novel folding forge, which by reason of its light weight and exceedingly small compass, when knocked down and packed within its case, renders it a valuable article for army and navy use. The outside dimensions of the case into which it packs are but 22½x27½x10 in. The forge is designated as the Buffalo army and navy forge. It is in use in the imperial Japanese navy. The company recently received a rush order for 100 of these forges for use by the United States army in the Philippines. Owing to the necessity of shipping these forges on a certain transport only three days were given in which to fill the order, but the forges were completed and placed upon the transport in the specified time.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

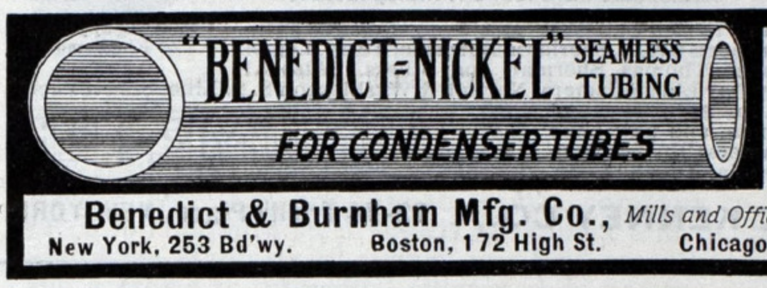
THE LATEST AND BEST STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON ORDER, OR STOCK ORDERS PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO 8 ,000 POUNDS WEIGHT.
MACHINE WORK AND PATTERNS FURNISHED WHEN REQUIRED.
RAIL OR WATER DELIVERIES.
CAPACITY, 1500 TONS PER MONTH.

Seaboard Steel Casting Co.,
CHESTER, PA.



Contains NO ZINC nor any weakening metal.
Send for Booklet with treatise on "Electrolysis of Condenser Tubes."

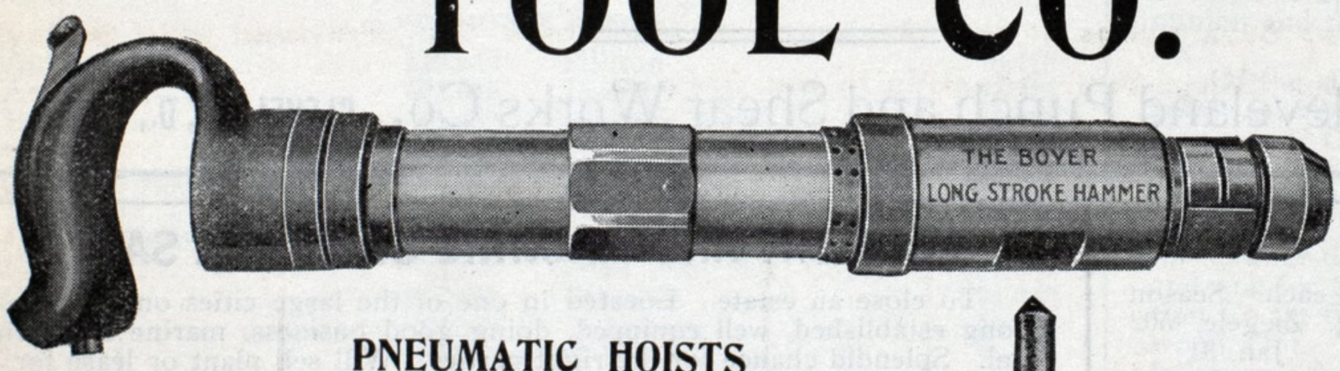
Benedict & Burnham Mfg. Co., *Mills and Offices.* Waterbury Conn.
New York, 253 Bd'wy. Boston, 172 High St. Chicago, Cor. Lake & Clark Sts.
V-WARING N.Y.

Paris Exposition, 1900, confers Highest Award and 2 Gold Medals
(Only Gold Medals in this Class.)

HAMMERS
for Chipping
" Calking
" Riveting
" Beading
" Stone Cutting, etc.

RIVETERS
for Shipyard use
" Boiler work
" Bridge work
" Structural work

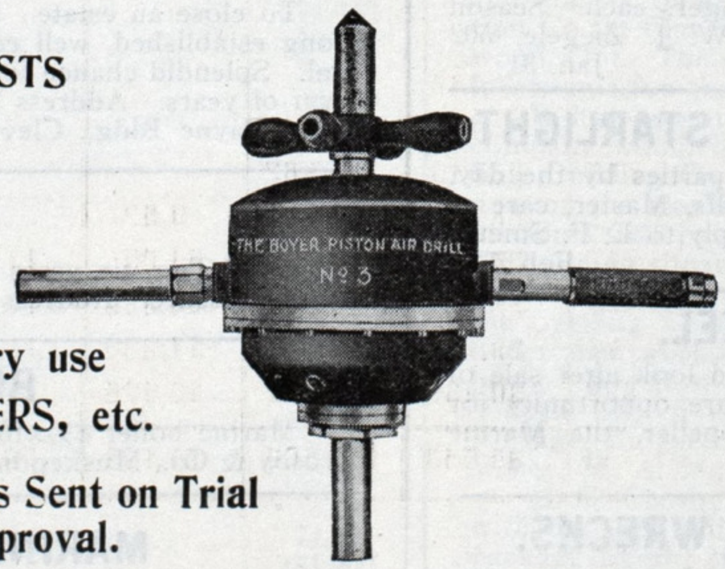
ON **CHICAGO PNEUMATIC TOOL CO.**



DRILLS
for Railroads
" Mines
" Quarries
" Foundries
" Machine Shops
" Wood boring

FLUE { Welders, Expanders, Reducers, Rollers, Cutters

PNEUMATIC HOISTS
CRANES
JACKS (Car and Locomotive)
PAINTING MACHINES
MOTORS for every use
CASTING CLEANERS, etc.



Pneumatic Appliances Sent on Trial Subject to Approval.

By actual statistics 95% of all Pneumatic Tools sold all over the world are our tools.

UNITED STATES COMMISSION
TO THE
PARIS EXPOSITION OF 1900

PARIS 20 AVENUE RAPP — CHICAGO AUDITORIUM BUILDING — NEW YORK EQUITABLE BUILDING

PARIS OFFICES,

August 21, 1900.

Chicago Pneumatic Tool Company,

Chicago.

Gentlemen:

Officially I desire to inform you that your pneumatic tools received at the hands of the International Jury of Award, a Gold medal. Also that Mr. Boyer was awarded a Gold Medal as collaborator and inventor of the tools.

Yours very truly,

F. E. Drake

Director of Machinery & Electricity.

New York Office: 95 LIBERTY ST.

CHICAGO PNEUMATIC TOOL CO.

GENERAL OFFICES: Monadnock Block, Chicago.

BRANCH OFFICES: 418 Exchange Building, Boston, Mass. 241 The Arcade, Cleveland, Ohio. Binz Building, Houston, Texas. 316 Lincoln Trust Building, St. Louis, Mo. 1016 Carnegie Building, Pittsburg, Pa. 421 Market Street, San Francisco, Cal. 605 Fidelity Building, Philadelphia, Pa.

FOREIGN REPRESENTATIVES: The New Taite-Howard Pneumatic Tool Co., Ltd., General European Agents, 63 Queen Victoria Street, London, E. C. John Macdonald & Son, No. 9 York Street, Glasgow. Schuchardt & Schutte, Spandauer-Strasse 59-61, Berlin, Germany; Brussels, Belgium; St. Petersburg, Russia; Vienna, Anstria; Stockholm, Sweden. H. Glaenzer & Perreaud, 1 Avenue De La Republique, Paris, France and Spain. H. W. Peabody & Co., Sydney, New South Wales.

CHANGE IN THE COST OF BATTLESHIPS.

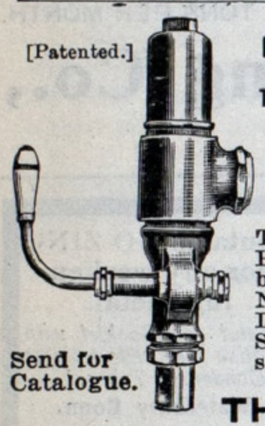
Secretary Long has written a letter to the chairmen of the congressional committees on naval affairs advocating a change in the limit of cost for the two battleships and the two armored cruisers recommended in his last annual report. In the case of the battleships he urges that the limit of cost be increased $250,000 in each case, and that a decrease of $250,000 be made in the limit of cost of each armored cruiser. He explains that his recommendation is based on experience gained in the recent competition among ship builders for the construction of naval vessels of the character in question. The bids received for each class of ships showed that the limit of cost was too low in the case of battleships and too high in the case of armored cruisers. The change recommended would make the limit in the case of battleships $3,850,000, and in the case of armored cruisers $4,000,000, but, as the secretary explains in his letter to the committees, would not increase or decrease the total appropriations necessary for the four ships last recommended by the department.

At the large Biwabik iron mine on the Mesabi range of Minnesota there are three steam shovels made by the Bucyrus Co. of South Milwaukee, Wis. Two of the shovels are 85-ton and one 65-ton. These mined in the past season from its natural bed 915,000 gross tons of ore, working day shift. In a single month they mined 205,000 tons. One of these (the 65-ton), in ten hours loaded 185 twenty-nine-ton cars, or 5,365 gross tons.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

THE FLUSHOMETER THE KENNEY SYSTEM.

[Patented.]



Send for Catalogue.

FOR FLUSHING WATER-CLOSETS.

The best system ever invented for use on steam vessels.
No Cup Leathers or Springs.
Owners and Constructors of Steamships, Yachts and Steamboats have found it indispensable.

Showing application of Flushometer.

Used by the U. S. War and Navy Departments—Transports Grant, Sheridan, Burnside, Terry, Logan, Hooker, Thomas, Sherman and others. Also Albany Day Line Steamers, Norfolk & Washington S. S. Line, Steam Yachts Neaira, Aphrodite and Loando, and new Lake Steamers Illinois, Pennsylvania, Angeline, etc.

FLUSHOMETER TRADE MARK

THE KENNEY CO., 72-74 Trinity Place, NEW YORK.

We Don't Offer Something for Nothing

We are not in the gift enterprise or in the chromo business, neither can we give away a farm or a free trip around the world with every pound of packing sold.
We are in the packing business pure and simple.
Have devoted a quarter of a century to practical study and hard work, and from a small beginning have built a large and successful trade—SECOND TO NONE. We manufacture

Garlock's HIGH-GRADE Packings

exclusively. They are well known and used the world over. There is nothing pertaining to the experimental in their use.
We are serving thousands of engineers in every section of the globe—can we serve you?

Send for catalogue and samples to our nearest office.

THE GARLOCK PACKING CO.

NONE GENUINE — TRADE Garlock MARK — WITHOUT IT.

New York. Philadelphia. St. Louis.
Boston. Pittsburg. Denver.
Chicago. Cleveland. San Francisco.

MAIN OFFICES AND FACTORIES:
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Thearle's Works ON SHIP BUILDING.

STANDARDS IN ENGLAND AND SCOTLAND

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

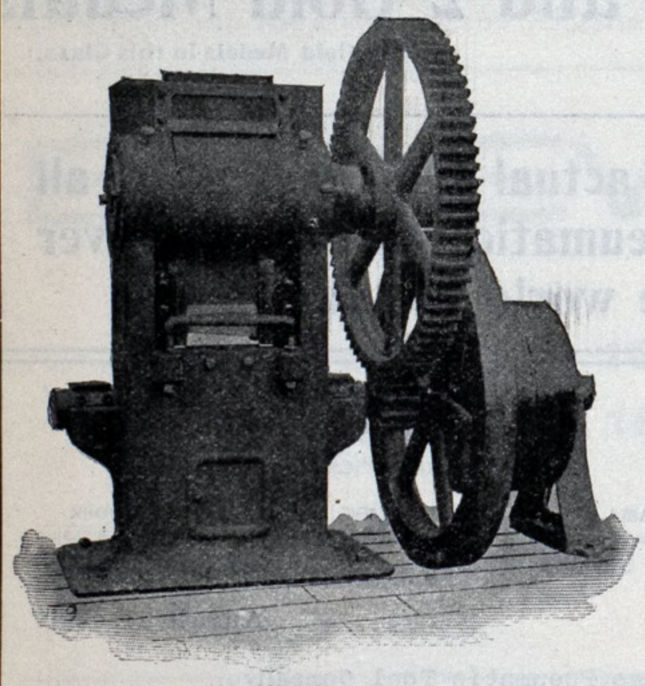
"Ship Building in Iron and Steel." (Plates in separate volume.) $5.25.

"Ship Building and Laying Off." (Plates in separate volume.) $3.00.

"Theoretical Naval Architecture." (Plates in separate volume.) $3.50.

THE MARINE REVIEW PUB. CO, CLEVELAND.

THIS ILLUSTRATES OUR BAR SHEAR



which we build in five different sizes. This is a very handy tool for cutting rods, bars and odds and ends of various kinds.

No. 1 has a capacity to cut 1″ round iron.
No. 2 has a capacity to cut 1¾″ round iron.
No. 3 has a capacity to cut 2¼″ round iron.
No. 4 has a capacity to cut 3″ x 3″ billets.
No. 5 has a capacity to cut 4″ x 4″ billets.

We shall be pleased to furnish further particulars regarding this machine.

The Cleveland Punch and Shear Works Co., CLEVELAND, O., U. S. A.

EXCURSION BOATS.

Two are wanted that will carry 400 to 500 passengers each. Season charter is offered. Draught not more than 6 ft. W. J. Ziegele, 502 Prudential Bldg., Buffalo, N. Y. Jan. 31

LARGE PRIVATE SCHOONER-YACHT STARLIGHT

of Chicago for sale or can be chartered for private parties by the day, week or month. For charter apply to R. E. Smethells, Master, care of Columbia Yacht Club, Chicago. For terms of sale apply to L. F. Smethells, South Haven, Mich. Feb. 7.

PATENT PROPELLER WHEEL.

Wanted, man to establish office in New York and look after sale of wheels. Already in use on hundreds of vessels. Rare opportunity for the right man. Address Manufacturers Patent Propeller, the Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. d

RUDDER, WINDLASS, Etc., FROM WRECKS.

For Sale—Iron rudder from wrecked steamer St. Lawrence; steam windlass and capstan from wrecked steamer Tuttle; also chain and anchors from Tuttle. E. G. Crosby & Co., Muskegon, Mich. Feb. 7.

WOLVERINE GASOLINE ENGINE FOR SALE.

Two cylinders, upright and of 47 H.P.; weight 5,500 lbs. Cost new $1,285. Used less than sixty days. In perfect order. Showed a brake test of 47 H.P. Spot cash price $675. Backus Gas Engine Co., 171 Lake street, Chicago, Ill. Feb. 7.

FOUNDRY AND MACHINE SHOP FOR SALE.

To close an estate. Located in one of the large cities on the lakes. Long established, well equipped, doing good business, marine and general. Splendid chance for the right parties. Will sell plant or lease for a term of years. Address "Administrator," care Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. tf.

TUG FOR SALE.

Good Tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Feb. 28.

BOILER FOR SALE.

Marine boiler 8½x16 ft. Allowed 109 lbs. of steam. Address E. G. Crosby & Co., Muskegon, Mich. Jan. 24

MARINE ENGINES FOR SALE.

One fore-and-aft compound 28 and 50x42 in. stroke. One fore-and-aft compound 27 and 50x40 in. stroke. Address E. G. Crosby & Co., Muskegon, Mich. Jan. 24

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf